

# AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING  
SHEET METAL CONTRACTING



Adequate ventilation is rapidly assuming a volume of first magnitude for our industry. Small industries, where true air conditioning is not economical, are looking to straight ventilation for relief. An article in this issue covers exhaust for printing presses.

ABLISHED  
8 8 0

APRIL  
1937

THE AIR CONDITIONING SECTION

Photo by  
Courtesy of  
Bradley,  
Delavan, Wis.

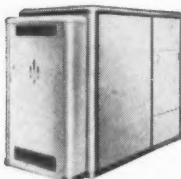


## SMART STYLING . . .

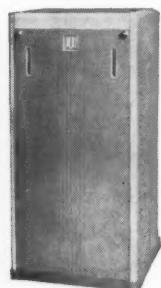
### SELLS UNITS *Beautified* BY BERLOY TAILORED STEEL JACKETS AND CASINGS!



Berloy Water Cooler Cabinet for Empire Water Cooler Co., Chicago, Illinois.



Berloy Casing for Air-Conditioner Furnace, Ideal Furnace Co., Detroit, Mich.



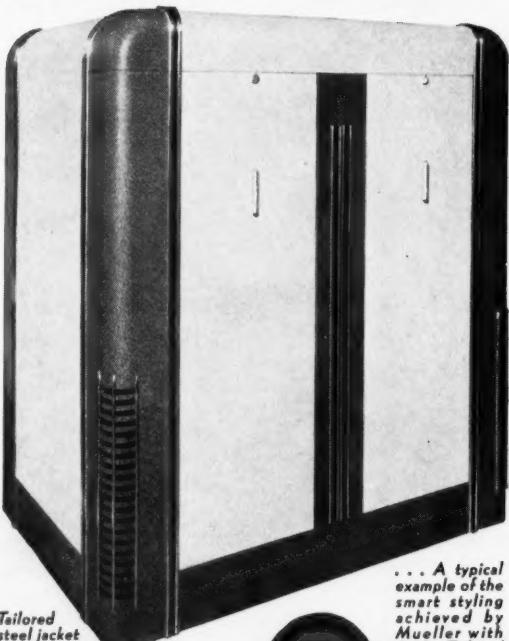
Berloy Boiler Jacket for Kelvinator Corporation, Detroit, Michigan.

- Let Berger modernize and beautify the boilers, oil burners, water heaters, stokers and air-conditioning units you manufacture, with Berloy steel jackets tailored to individual needs!

We can definitely help you create a greater demand for your products. A highly competent, widely-experienced staff of designers is prepared to analyze your requirements, and submit recommendations.

Berloy metal-working specialists, supported by complete, efficient facilities for sheet metal products of every description, can develop low-cost production schedules for your jackets and casings.

Write Berger for free engineering advice on your jacket and casing problems, now!



Tailored  
steel jacket  
forgasfurnace,  
especially designed by and  
made for the L. J. Mueller Furnace Co., Milwaukee, Wis.

. . . A typical example of the smart styling achieved by Mueller with Berloy Tailored Steel.



THE BERGER MANUFACTURING COMPANY  
DEPARTMENT A, CANTON, OHIO

BERLOY



Planoidal  
Blower Patents  
1998184  
2048123  
Ballentine  
Capacitor Motor  
Patent No. 2071224

## ONLY Hold-Heet Giant Nite Fans Have:

**Easy, Economical Installation**  
No Housing, Suction Box or Ducts  
Noiseless Planoidal Blower  
Quiet, Efficient, Round Cabinets  
Multi-speed Control  
Lifetime Slow Speed Motor  
No Belts or Pulleys  
Compact Vertical Operation  
Capacitor Motors—

—Capacitor start and capacitor run with oil condenser—insuring low starting current and maximum efficiency. Do not confuse with split phase motors or motors using electrolytic condensers for starting only.

**Shipped Complete . . . Fully Assembled**  
Giant Nite Fans are shipped complete. The units come fully assembled with cabinets as pictured, complete with top screen and control box. A rigid welded I-beam construction carries the motor and blower in rubber sound insulating supports. The 100-speed control box for the NO1 Unit must be mounted on the unit as illustrated. The control box with 8-speed switch and autotransformer for the NO7 unit may be remotely mounted if desired.

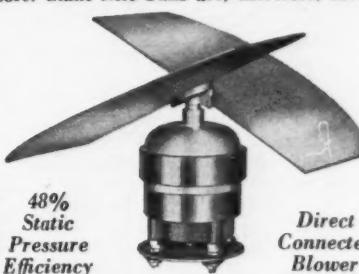
### GRILLS:

Grills available as extra equipment. These steel grills with 1" square openings and 3/16" bars have 71% free area. Wood molding is to be supplied by installer to support the grill and finish the openings around the sides.

29 $\frac{3}{4}$ "x29 $\frac{3}{4}$ "—14 gauge for NO1 Unit  
List Price, \$6.85  
47 $\frac{3}{4}$ "x47 $\frac{3}{4}$ "—12 gauge for NO7 Unit  
List Price, \$14.85

**A NIGHT FAN** (1) can last no longer than its motor; (2) can be no more efficient than its blower. This is the highest quality equipment the market affords. Every heating man should go after this profitable market. Write today for all the facts with University of Illinois' research data. Portable units are also available.

48%  
Static  
Pressure  
Efficiency



Catalog No.	Height	Diameter	Capacitor Motor	Planoidal Blower	Control Switch	Top Speed	C.F.M. at .05"	C.F.M. at .10"	C.F.M. at .15"	Shipping Weight	List Price
NO1	17"	30 $\frac{1}{4}$ "	1/6 h.p. 8-pole	23"	100 speed	820 r.p.m.	2,800	2,500	2,100	110 lbs.	\$98
NO7	22"	48 $\frac{3}{4}$ "	1/2 h.p. 12-pole	36"	8 speed	550 r.p.m.	10,000	7,700	6,600	315 lbs.	\$248

Also Portable Nite Fans for: Offices,  
Apartments, Hotels, Stores, Etc.

**RUSSELL ELECTRIC CO., Mfrs.**

342 W. HURON ST.  
CHICAGO, ILLINOIS

## In This Issue

It has been our contention that many industries will find full air conditioning unprofitable. These same industries, however, will find exhausting and straight ventilation both necessary and advantageous. In this issue (page 22) we introduce R. M. Jeske, a new author, who will cover this exhaust and ventilation field with a case study of actual installations.

★

Platte Overton on page 24 brings to a close his "first-time," three-part discussion of church heating. Readers tell us this series on heating the larger building with a fan-furnace system is the best thing of its kind ever published. Additional types of buildings will be covered.

★

With basement decoration becoming an everyday matter, the problem of painting duct work always confronts us. On page 30 is an article telling how to prepare galvanized iron for painting. Those who were surprised with "peeling" may find a few hints.

★

With April comes Spring. And with Spring we will soon have Summer. According to advance notices this is going to be a real cooling summer. With all industries anxiously viewing the residential field for the big unit sales we publish part one of a resume of what our industry has established about house cooling in our own Research Residence. See page 55.

★

Part two of the new Technical Code for Mechanical Heating appears on page 61. Approximately one additional issue will be required to cover the code. However, we strongly recommend that readers spend 50 cents for a complete copy. Order from the National Warm Air Heating and Air Conditioning Association, Columbus, Ohio. After we print the code we will take a typical house plan and show a step-by-step layout of a job.

★

During the summer we will publish a number of case examples of cooling. The first article covers a New Zealand furnace works and shows where a "blow in" system failed to cool, whereas an exhaust system worked like a charm. See page 64.

★

S. Konzo appears on page 56 with the next to the last article on various ways to size ducts. This sizing series will be completed in the May issue. If you have any questions hurry them in.

★

And for those merchandisers who look for the answers to "I can't afford," "See Me Later," "I'll Think It Over" we publish on page 68 some answers found suitable for all parts of the country.

# AMERICAN ARTISAN

With which is merged

FURNACES  
AND  
SHEET METALS

Warm-Air  
Heating

Covering All Activities in  
Gravity Warm Air Heating      Forced Warm Air Heating  
Sheet Metal Contracting      Ventilating  
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor

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Vol. 106, No. 4

April, 1937

Founded 1880

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**More than 8,000 Copies of this Issue are being distributed**

# Start YOUR MEN working

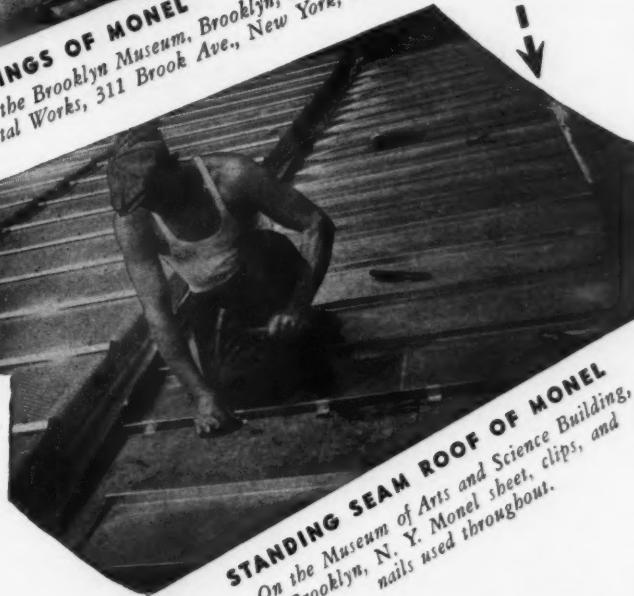
*on jobs  
Like These!*



**TIE WIRE OF MONEL**  
Attaching tile on roof of Capitol Power Plant, Washington, D. C., with Monel tie wire.



**CAP FLASHINGS OF MONEL**  
On the parapet wall, D wing of the Brooklyn Museum, Brooklyn, N. Y. Fabricator, Co-operative Sheet Metal Works, 311 Brook Ave., New York, N. Y.



**STANDING SEAM ROOF OF MONEL**  
On the Museum of Arts and Science Building, Brooklyn, N. Y. Monel sheet, clips, and nails used throughout.

**MEN** working! Words that always carry a warm and welcome sound . . . all the more so when the men are yours.

Pictured here are three active jobs where profits were drawn. Get jobs like these by going out and selling roofs and roof trim of Monel.\* Have you tried this method?

Once you get all the facts about Monel roofing, you'll find plenty of jobs in your neighborhood just crying out to be done. Some of the facts that got these contractors their jobs:

Monel goes on any building TO STAY. This Nickel Alloy is not only stronger than plain steel . . . it resists corrosion from the fumes and soot of the city. It's not only rust proof . . . its smooth hard surface fights off erosion from snow and rain and the scraping of feet.

Yet with all this Monel can be fabricated by all standard methods.

Those are the reasons why Monel now forms the entire roof of the Pennsylvania Station in



New York. After 25 years on this tough job, engineers estimate this roof as good for another 300 years.

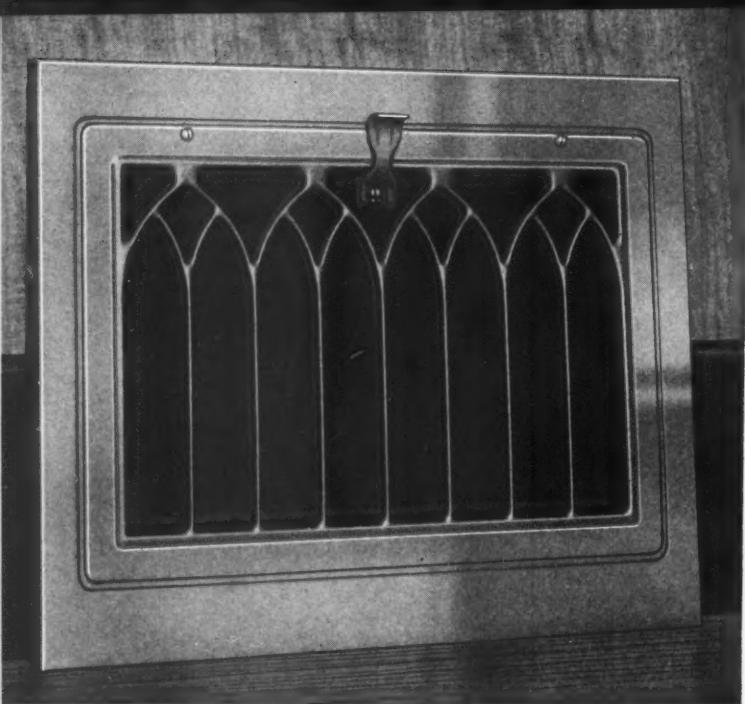
So go out and tell this profit-making story to property owners near you. Write us to-day for "Monel for Permanent Roofs."

\* \* \*

THE INTERNATIONAL NICKEL COMPANY, INC.  
67 WALL STREET NEW YORK, N. Y.

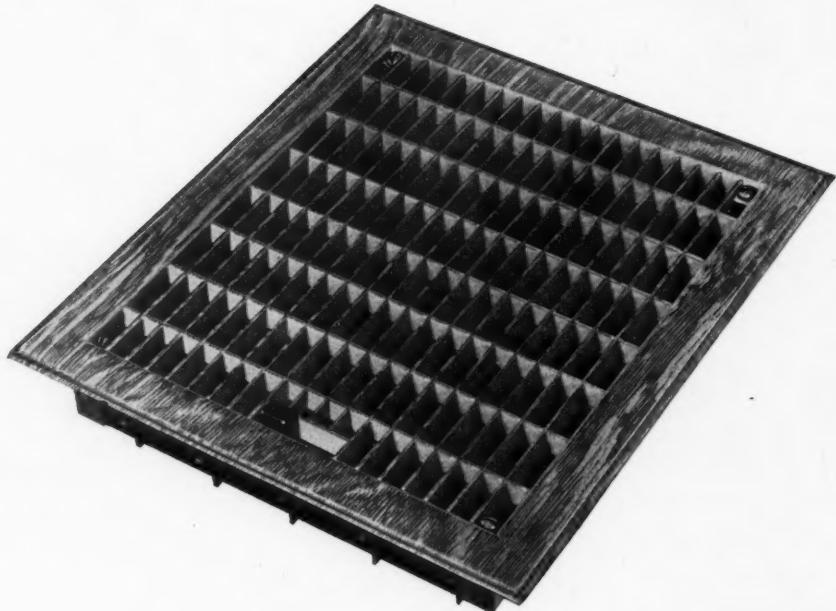
# MONEL

\*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled and marketed solely by International Nickel.



**O**F the gravity registers at present bidding for popular favor, these three newer members of the H & C Line have definitely established themselves as Leaders in the Hit Parade. The way installers everywhere are turning to these items demonstrates that they have "it" in abundance—the appeal of attractive appearance, careful skilled workmanship, fine finish and all the qualities that make for neat, secure, satisfaction-giving installations. If you believe, as nearly all alert installers do, that it pays to handle the best registers available, by all means inspect these registers and the rest of the great H & C Line at your H & C Jobbers.

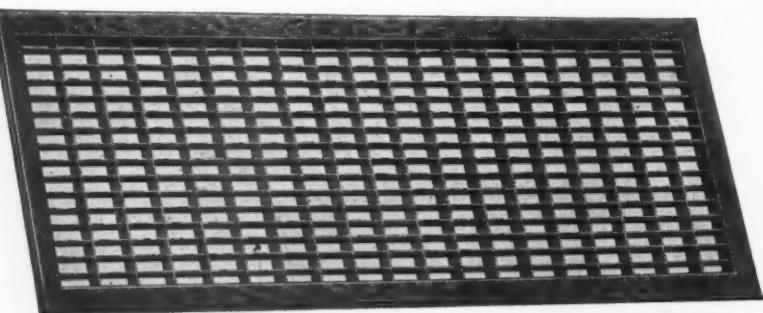
If you haven't as yet received your copy of the new H & C General Catalog No. 37, or Air Conditioning Catalog No. 37AC, ask your Jobber for one or write direct.



UPPER LEFT: H & C No. 120 Baseboard Register combines the most popular face design ever incorporated in a baseboard register, with a construction that permits the stackhead to be lapped over the register frame—insuring a very neat, tight installation.

CENTER: H & C No. 210 "NO-FLEX" Floor Register. Exceptionally rigid, with mesh openings  $7/16" \times 1 7/16"$ . Because there is no premium price for this heel-proof sturdy register, it is recognized as the outstanding value in floor registers.

LOWER LEFT: H & C No. 265 "NO-FLEX" Return Air Face. Combines many superior features of construction. Cross members are welded to each other and to the frame for maximum strength. Upper edges of members are squared for better walking surface. Corner joints are invisible. Margins are narrow for close installation.



**HART & COOLEY MANUFACTURING CO.**

Warm Air Registers  
Damper Regulator Sets



Air Conditioning Grilles  
Dampers, Chain, Pulleys

**61 W. KINZIE STREET, CHICAGO, ILLINOIS**  
ENGINEERING OFFICE AND FACTORY • HOLLAND • MICH.

The "Five Star" Feature Warm Air  
and Air Conditioning Lines for

COAL  
OIL  
GAS

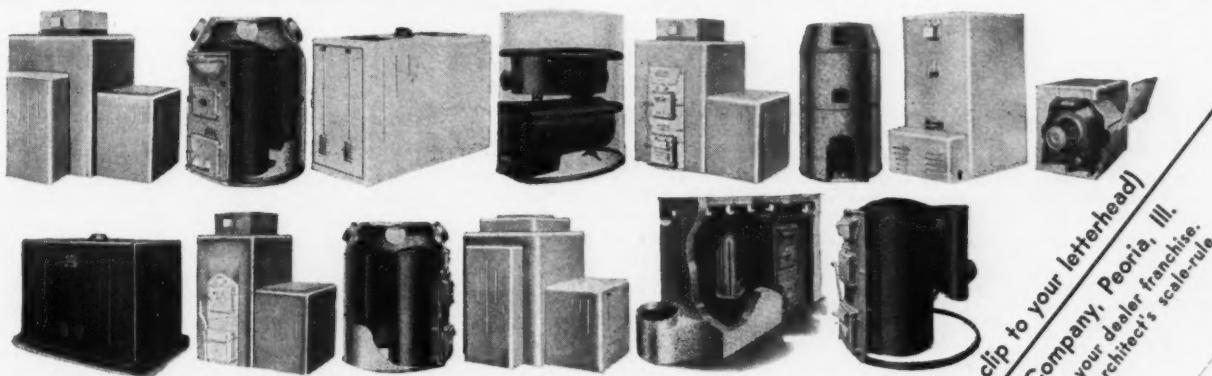
**WEIR MEYER**



"WHO MAKES IT  
MAKES A DIFFERENCE"

These lines offer you everything you want. Local leadership . . . a "price" line where price is what counts (with quality features that out-value your competition) . . . plus strictly QUALITY lines that stand head and shoulders above all competition . . . air-conditioning equipment

that is the best-engineered in the industry . . . specifically designed for coal, oil or gas . . . an enviable reputation with your trade . . . and a degree of dealer co-operation and protection that will make you sales—and profits! Send the coupon TODAY.



THE MEYER FURNACE COMPANY



PEORIA, ILLINOIS

(Sign—or clip to your letterhead)  
The Meyer Furnace Company, Peoria, Ill.  
 Send the details of your dealer franchise.  
 Send us your FREE architect's scale-rule (pocket size).



. . . so ductile it can easily be formed into complicated shapes.

# U·S·S STAINLESS STEEL

*when you know how.  
It's simply a question  
of good tools and cor-  
rect practice.*

## TACK UP

these fabricating directions  
on your shop bulletin board,  
or send for a reprint specially  
prepared for that purpose.



. . . always drill with considerable pressure  
and a sharp tool.

**ANNEALING:** To anneal USS 18-8 Stainless Steel properly, the entire work should be heated to approximately 1950° F. and then cooled as rapidly as possible, preferably by quenching. This annealing eliminates any hardening or strain which previous cooled work may have caused, restores the stainless alloy to a completely austenitic structure of proper grain size—the structure of a maximum ductility, softness and corrosion-resistance.

**SOLDERING.** In spite of its highly impermeable surface, USS 18-8 may easily be soldered if the surface is thoroughly cleaned and etched with a suitable acid (e.g. muriatic acid plus zinc chloride or 10% phosphoric acid). The zone to be soldered should be thoroughly etched—but it must be remembered that the etching fluid is highly corrosive. For this reason, care should be taken not to etch beyond the zone to be soldered and the flux must be thoroughly cleaned with dilute alkali immediately after soldering. Soldering, however, does not make a strong joint, and should ordinarily be used only to seal a joint secured by riveting or spot welding. 75% tin—25% lead solder is recommended because it discolors less rapidly. Stainless Steel may be silver soldered, etc., with special hard solders and fluxes available for this purpose from commercial suppliers.

## CUTTING OPERATIONS.

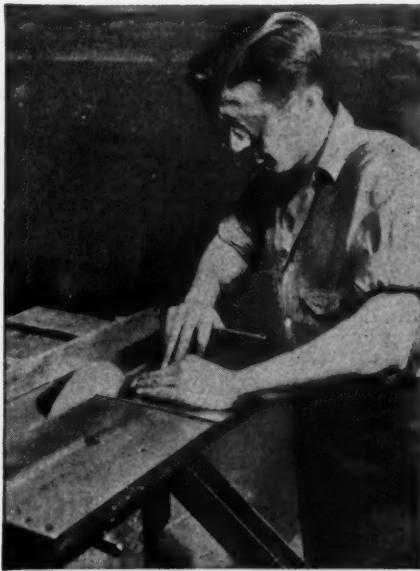
USS 18-8 may be sawed, machined, drilled, and threaded; but it is necessary to keep in mind that this metal is exceptionally strong and tough, and that it hardens quickly under cold work. For these reasons, the art of cutting USS 18-8 may be summed up by these recommendations: (1) reduce cutting speeds, (2) take heavy cuts, (3) use sharp high speed tools, and (4) a generous rake. In sawing, for example, the saw should be heavily weighted and so applied that the first stroke definitely cuts the metal. A wavy set saw is recommended. If the saw is allowed to ride over the work without deep cutting, the stainless steel will quickly work-harden and become more difficult to cut. It may be cut dry, or with lard oil-sulphur lubricant. Tools should be sharp and kept sharp. A moderate amount of heating will make the cutting even easier.

**PASSIVATION.** During fabrication operations, particles of base metals may become imbedded in the surface of stainless steel. These contaminating metals may, of course, corrode or discolor and give the false impression that the stainless steel itself is being corroded. Exposure for ten to fifteen minutes to 10-20% nitric acid (125-140° F.) will dissolve these particles and eliminate this potential source of trouble; it also

passivates the surface of the stainless steel, giving it its highest degree of corrosion-resistance. Where dipping is impractical, the surface may be swabbed for five to ten minutes. The nitric acid treatment should always be followed by a thorough hot-water rinse.

**PICKLING.** For pickling USS 18-8 a hot solution is necessary. We recommend two solutions: 10% sulphuric acid with 10% common salt; or 20 parts of commercial nitric acid, 1 to 4 parts hydrofluoric acid plus water to make 100 parts by volume. Pickling should continue until scale is loosened and the remaining scale thoroughly scrubbed off. After pickling, the stainless steel should be well rinsed in hot water, passivated by a few minutes dip in 10-20% nitric acid (125-

# is Easy to Fabricate...



. . . and cut with a wavy set saw or an abrasive cutting wheel.



. . . polish or buff at slower speeds to any finish you desire.



. . . easily and neatly welded.

140° F.), and then given a thorough final hot-water rinse.

## PUNCHING & SHEARING.

For best results the engaging parts employed for shearing and punching should engage more neatly and with less clearance than those used for ordinary steel. It is particularly important that punches be maintained very sharp and be set so as to cut completely through the metal since USS 18-8 will not snap out or break through as ordinary steels do. The exceptional ductility of USS 18-8 may cause the metal to drag if these precautions are not observed.

**RIVETING.** USS 18-8 is well adapted to riveting, either hot or cold. Rivets up to  $\frac{1}{4}$ " may be driven cold; hot rivets should be heated out of contact with a flame to 2100° F. and be set before they cool below 1800° F.

**FORGING.** USS 18-8 is readily forged at 2250° F., although it forges more slowly and will require more hammer blows, owing to its unusually high strength at high temperatures. Heating requires a longer time than

is allowed for ordinary steels. Soaking at 1500° F. is recommended, to be followed by rapid heating to 2250° F. It is advisable to reheat if the work cools to 1600° F. before the forging is completed.

**POLISHING.** Polishing technique will vary greatly with the contour of the surface and the type of finish desired. Silicon carbide and aluminum oxide type abrasives are the most suitable; coarser grits may be used dry, finer grits and buffing on a soft grease wheel with high - softening - point stearic - base grease. Abrasives must be iron free; otherwise the surface may be contaminated with iron compounds which will rust or discolor. Since high grinding speeds may roughen the surface of stainless steel, speeds during grinding should not exceed 8000 feet per minute; during buffing 12,000 feet per minute. For buffing use "white rouge" or "green rouge"—never red, because of its iron content. To avoid scorching, open, well-ventilated wheels should be used since stainless steels are poor conductors of heat.

**SPINNING.** Owing to its high ductility USS 18-8 is well adapted to spinning but will, of course, require more power. Large radius spinning tools and slower speeds are advisable.

Lubrication is desirable — we recommend equal parts of volume of lithopene and linseed oil. If the stock becomes excessively work-hardened before the desired deformation is obtained, it should be thoroughly cleaned, annealed at 1950° F. and quickly cooled in the air or by a water quench. The entire stock should be raised to the indicated temperature. This treatment will restore the stainless alloy to its original soft, ductile condition.

**WELDING.** USS 18-8 is well adapted to welding by electric resistance, electric arc, acetylene or atomic hydrogen methods; it cannot be hammer welded satisfactorily.

Surfaces should be thoroughly cleaned; in gas welding the flame should be as small as possible and practically neutral (reducing flames contain carbon, oxidizing flames may cause excessive slag), and it should be directed toward the unfinished work to avoid excessive heating. Do not puddle the weld. In electric welding the work should be negative; a current of about 40 amperes at 35 volts (open circuit) is generally satisfactory for a  $3/32$ " rod, the current increasing with the rod diameter.

After welding, the bead should be ground flush with the surface and all oxide or discoloration adjacent to the weld removed. Puddling must be avoided.

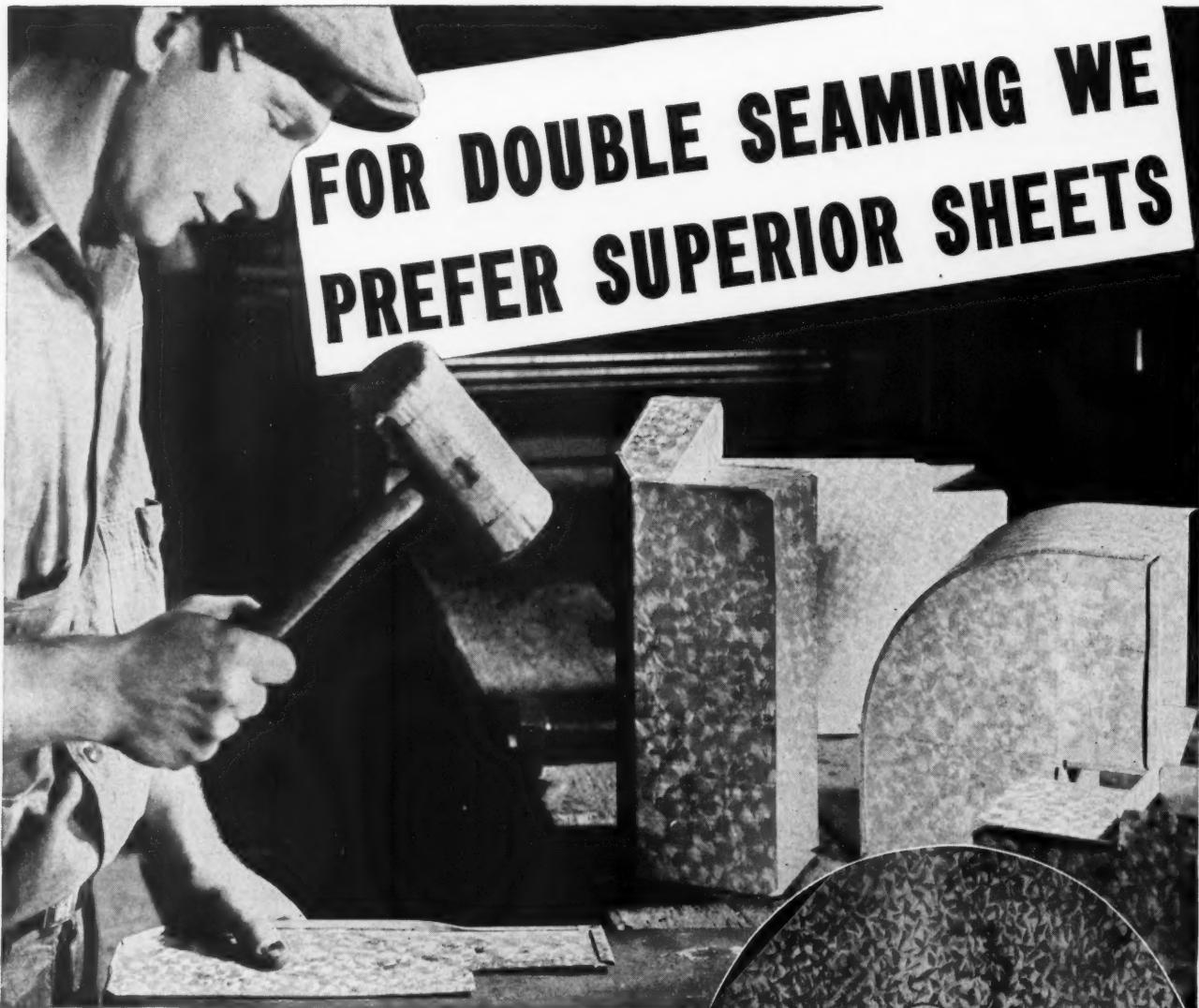
## U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, Chicago and New York  
CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago  
NATIONAL TUBE COMPANY, Pittsburgh



Columbia Steel Company, San Francisco, Pacific Coast Distributors • United States Steel Products Company, New York, Export Distributors

UNITED STATES STEEL



★ "Our business has been built up on the basis of quality work. For instance, all our work is double seamed," says the manager of an old sheet metal contracting firm in Chicago, "and that's why we prefer Superior Sheets for our work."

Besides reducing labor costs, the workability of Superior sheets will enable you to turn out a better and neater job. In Superior you get special analysis steel . . . easily fabricated . . . uniform zinc coatings scientifically applied by the *Superior process*, known wherever coated sheets are used.

**THE SUPERIOR SHEET STEEL CO., Canton, Ohio**  
Division of CONTINENTAL STEEL CORP., U. S. A.

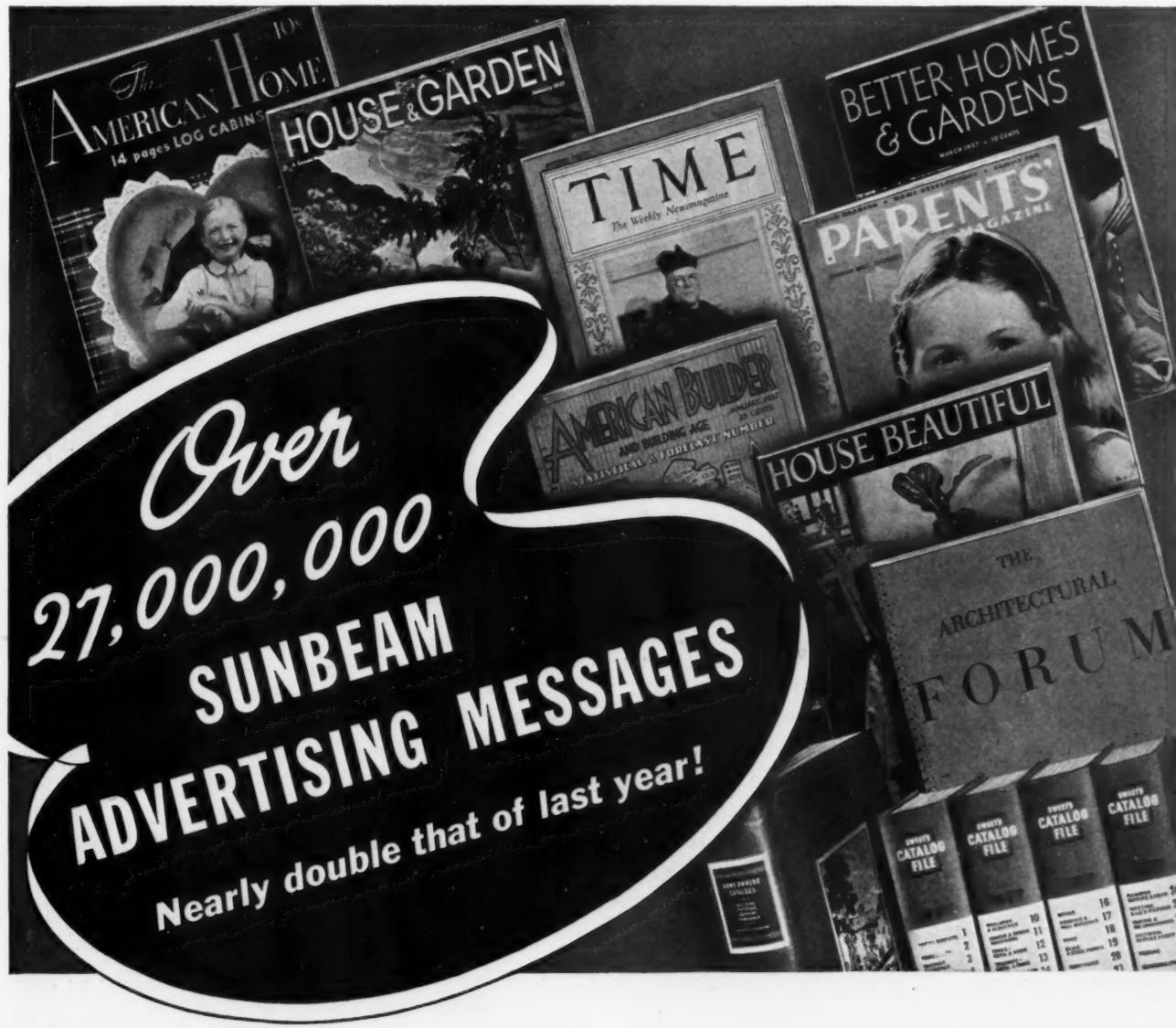


#### OPEN HEARTH STEEL SHEETS

Galvannealed  
"Super-Metal"  
Long Ternes  
Galvanized Sheets  
Galvanized Roofing

Hot Rolled  
Hot Rolled Annealed  
Hot Rolled Pickled  
Hot Rolled Deoxidized  
Blued Stove Pipe Stock

**SUPERIOR**  
MODERN SHEETS FOR SHOP AND FACTORY



## YOUR PROSPECTS will get the Sunbeam story

In 1937 SUNBEAM will use more National Magazines than ever before! Over 27 MILLION SUNBEAM messages will be spread across the country. Hundreds will go into *your own* territory, carrying the SUNBEAM story into the homes of your *prospects*. "SUNBEAM" will be their name for Air Conditioning.

SUNBEAM advertising brings in the names of

many good prospects in every territory. These names are immediately sent to the SUNBEAM Dealer and offer real opportunities for profitable sales. With the complete SUNBEAM line of seven different types of Air Conditioning units and four different types of gravity furnaces . . . at present low prices . . . you are in a position to land a big share of the business. Go after it—use the coupon.

**THE FOX FURNACE COMPANY, ELYRIA, OHIO**

Division of American Radiator & Standard Sanitary Corporation



The Fox Furnace Co.,  
Elyria, Ohio.

How can I obtain a SUNBEAM Dealer Franchise and get the benefits of (1) SUNBEAM advertising, (2) low prices and (3) the complete line of furnaces and air conditioners.

Name .....

Address .....

City ..... State.....

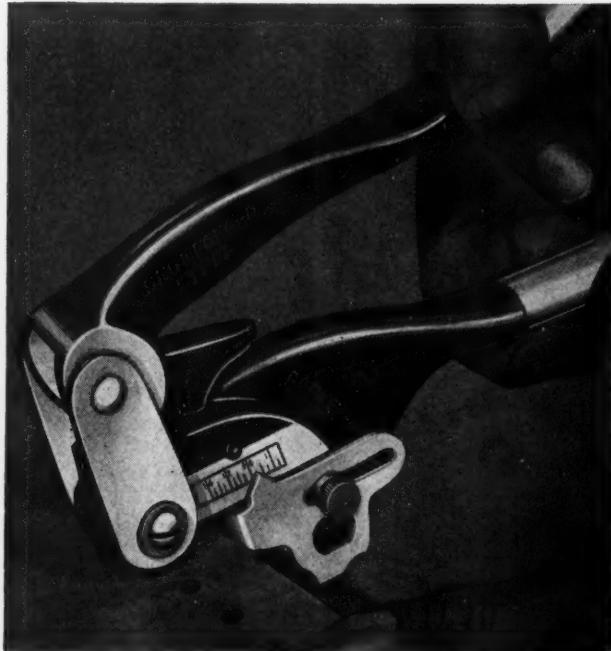
AA-4-37

# Where you find Good Workmen... you find Parker-Kalon Punches

*Any man who gets real pleasure out of working with good tools is bound to favor these Metal Punches*

You often hear it said that the ability of a workman can be measured by the tools he uses. Judging by the wide popularity of Parker-Kalon Metal Punches, there are plenty of good workmen in the sheet metal trades. For these Punches are the kind that a craftsman will pick instinctively.

Flawless castings . . . precision-machined parts . . . extra strength without the awkwardness of heavy weight . . . perfect balance . . . efficiency in design that shows the maker understands the job the tool is to do . . . all these qualities that make a good tool of any kind are combined in the two Parker-Kalon Metal Punches, shown here. Yet they cost so little that no man needs to work with Punches he can't be proud of.



Below are brief facts about Parker-Kalon Punches. Ask us for our folder that gives full details on all their features. Better still, have a look at them . . . your supply house will gladly show them.

**For Power and Hardiness  
use the Parker-Kalon No. O.X. Outfit**

Eight inches overall . . . weighing only 2½ lbs., this famous No. O.X. Metal Punch easily punches holes up to 17/64" in 14 gauge metal or equal. It has many superior features such as a front pointer and side gauge combination to make work easier. Comes in a sturdy steel carrying case, complete with 7 punches and 7 dies.

**For both Hand and Bench Use  
get a Parker-Kalon No. X.X. Punch**

Take it away from the bench and out on a job . . . then back to the shop bench and slide it into its special stand to make a sturdy bench punch. It is popular for many other reasons, too. One is a throat opening, 3½" deep by 2½" high, that takes irregular shapes . . . using punches and dies from ¼" to 17/32" by 32nds. With ease it punches a ¼" hole in 14 gauge sheets or equal.

PARKER-KALON CORPORATION, 190 Varick St., New York

# PARKER-KALON CORPORATION

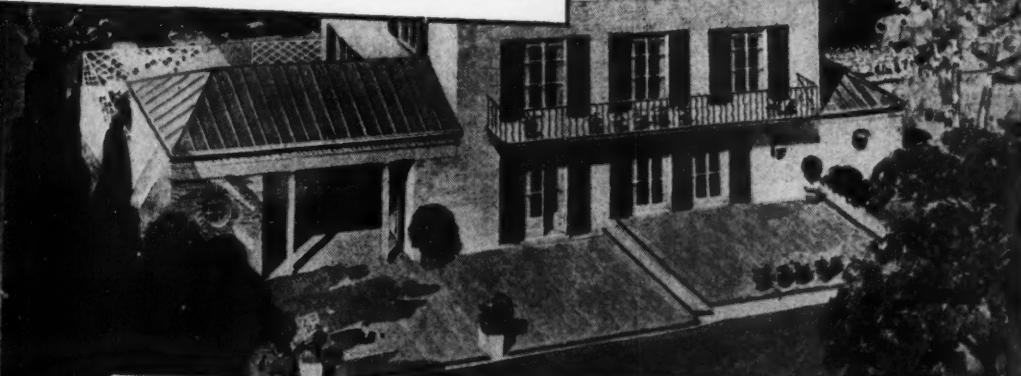
PARKER-KALON PRODUCTS ARE SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

# Here's How

... we're helping you get more good residential roofing. Write for complete information on Anaconda Economy Copper Roofing. Address The American Brass Company, Waterbury, Connecticut.

37228

HOUSE &amp; GARDEN 127



## A COPPER ROOF OF NEW DESIGN... and new low price

*A house with a standing seam copper roof designed by Frank J. Foster, Architect.*

### Architects call this Anaconda product a valuable contribution to the fine home

In their search for permanence, people have become accustomed to regard copper as the ideal roofing material. Now, their wish finds fulfillment. Thanks to new designs, you can have every advantage of genuine Anaconda Copper for the roof of your home at moderate cost.

Anaconda engineers have so planned this new Anaconda Economy Roofing that it is lighter in weight (10 ounces per square foot) and in narrower sheets. The space between standing seams is but 13½ inches. Thus this roof conforms to residential lines, yet has approximately the same rigidity and wind resistance as wider sheets of heavier metal.

Here is the opportunity to satisfy your desire for permanence and beauty. Have the roof of your new home made of Anaconda Copper as described here. Your sheet metal contractor will do the work under your architect's supervision. Write us and we will put you in touch with a contractor in your vicinity.

### These are the advantages of Anaconda Copper

**Charm and Dignity**—An Anaconda roof weathers so that it harmonizes with its surroundings.

**Fire-proof**—The flying spark hazard is completely eliminated when your roof is Anaconda Copper.

**Lightning-proof**—This roof can be grounded so that it effectively protects your house against lightning.

**Light weight**—Anaconda's design ends need of heavy, costly supporting structure.

**Protects insulation**—Anaconda Copper absorbs no moisture—insulating material of cellular type is completely protected against loss of efficiency.

**ANACONDA**

# Anaconda Copper

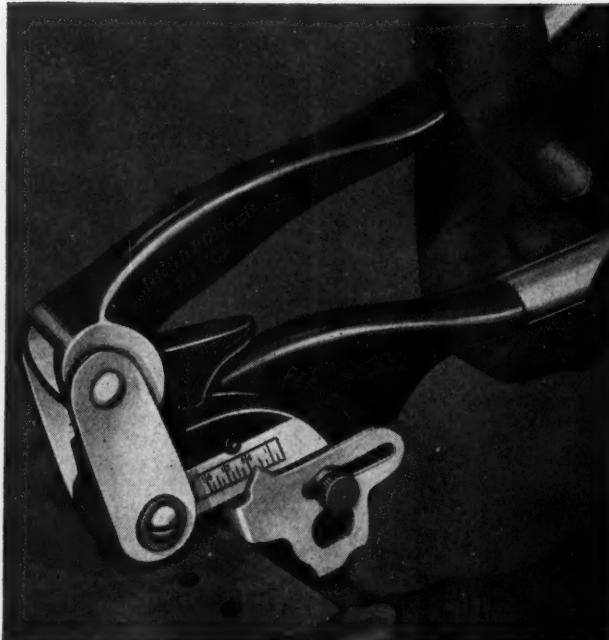
THE AMERICAN BRASS COMPANY, General Offices, Waterbury, Connecticut  
Offices and Agencies in Principal Cities • In Canada: The Anaconda American Brass Ltd., New Toronto, Ont.

# **Where you find Good Workmen... you find Parker-Kalon Punches**

*Any man who gets real pleasure out of working with good tools is bound to favor these Metal Punches*

You often hear it said that the ability of a workman can be measured by the tools he uses. Judging by the wide popularity of Parker - Kalon Metal Punches, there are plenty of good workmen in the sheet metal trades. For these Punches are the kind that a craftsman will pick instinctively.

Flawless castings . . . precision-machined parts . . . extra strength without the awkwardness of heavy weight . . . perfect balance . . . efficiency in design that shows the maker understands the job the tool is to do . . . all these qualities that make a good tool of any kind are combined in the two Parker-Kalon Metal Punches, shown here. Yet they cost so little that no man needs to work with Punches he can't be proud of.



Below are brief facts about Parker-Kalon Punches. Ask us for our folder that gives full details on all their features. Better still, have a look at them . . . your supply house will gladly show them.

**For Power and Hardiness  
use the Parker-Kalon No. O.X. Outfit**

Eight inches overall . . . weighing only 2½ lbs., this famous No. O.X. Metal Punch easily punches holes up to 17/64" in 14 gauge metal or equal. It has many superior features such as a front pointer and side gauge combination to make work easier. Comes in a sturdy steel carrying case, complete with 7 punches and 7 dies.

**For both Hand and Bench Use  
get a Parker-Kalon No. X.X. Punch**

Take it away from the bench and out on a job . . . then back to the shop bench and slide it into its special stand to make a sturdy bench punch. It is popular for many other reasons, too. One is a throat opening, 3½" deep by 2⅛" high, that takes irregular shapes . . . using punches and dies from ¼" to 17/32" by 32nds. With ease it punches a ¼" hole in 14 gauge sheets or equal.

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HOUSE &amp; GARDEN 127



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*A home with a standing seam copper roof designed by Frank J. Foster, Architect*

### Architects call this Anaconda product a valuable contribution to the fine home

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Anaconda engineers have so planned this new Anaconda Economy Roofing that it is lighter in weight (10 ounces per square foot) and in narrower sheets. The space between standing seams is but 13½ inches. Thus this roof conforms to residential lines, yet has approximately the same rigidity and wind resistance as wider sheets of heavier metal.

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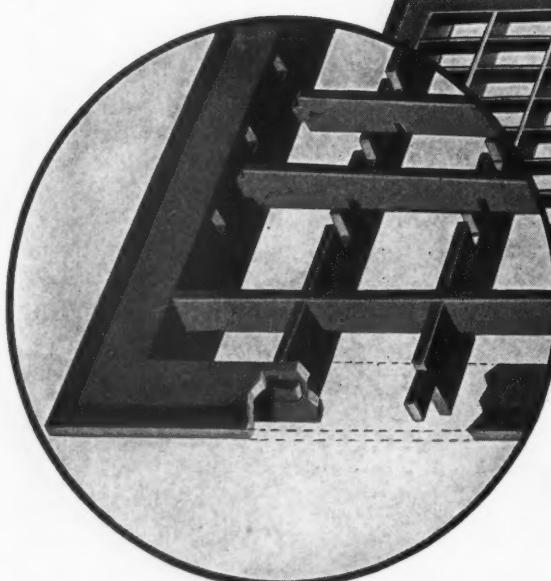
# Anaconda Copper

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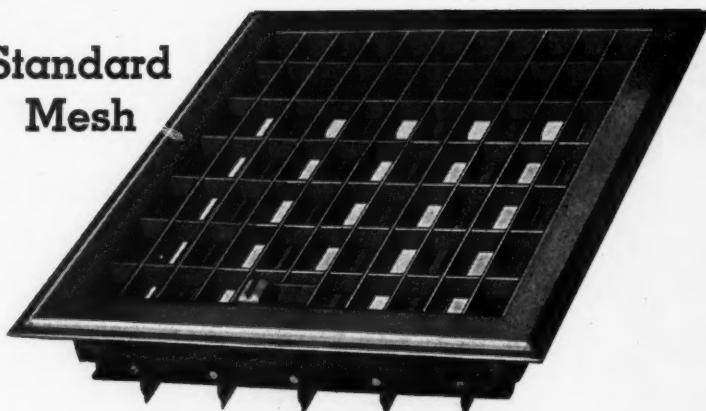
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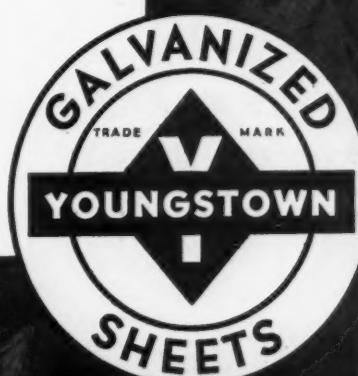
★It is very easy to assume that all galvanized steel sheets are alike in actual quality because they are so similar in surface appearance. To produce an occasional run of top-quality galvanized sheets is a relatively simple matter. To reproduce that same top quality day after day is a difficult assignment.

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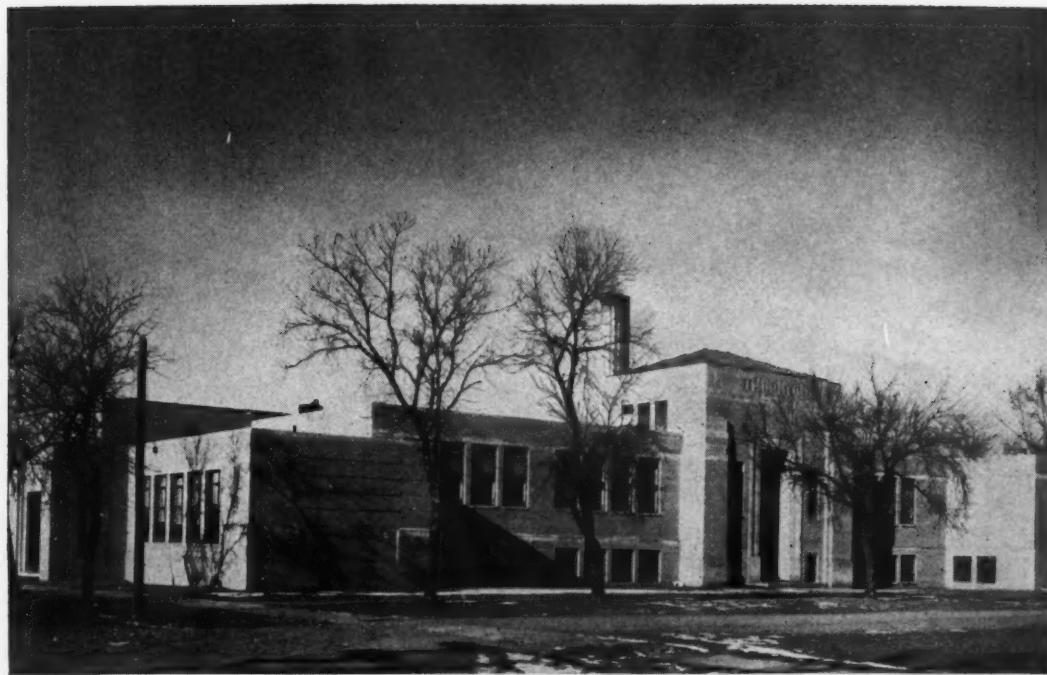
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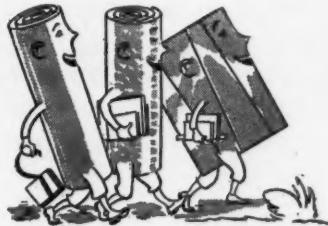
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Ceiling steel	Screws sheet metal
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Controls automatic heating	Sheets (Corrugated)
Eaves Trough see conductor pipe	Sheets (Perforated) steel and tin
Fans furnace, exhaust, propeller	Sheets (Plated) chrome and nickel plated zinc, copper, tin and steel
Furnace Pipe and Fittings	Siding galv. and painted
Furnaces	Snow Guards
Grilles	Solder and Fluxes
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Hangers eaves trough and gutter	Tools every kind used in sheet metal work
Hooks conductor pipe and flashing	Ventilators roof and fan
Humidifiers	Welding equipment and supplies; both arc and gas
Machinery hand, foot and power for sheet metal work	
Nails	
Paints tinner's red and house paints	
Paper asbestos, red rosin, building, asbestos mill board	
Registers warm air	
Ridge Roll corrugated, plain	



*Thornton Consolidated School, Thornton, Iowa. Revere products used: Leadtex, Cold-Rolled Sheet Copper, Cheney Flashing. Distributor: A. M. Castle Company, Chicago. Sheet Metal Contractor: Ray E. Pauley Company, Mason City, Iowa. Architect: Hansen & Waggoner, Mason City, Iowa.*



**I**N SCHOOL construction most communities put their best foot forward. School buildings are the pride of the townships. Naturally, Revere copper products are extensively used in school buildings, as in other structures where permanence, protection and appearance are important.

Approximately 1000 lbs. of Leadtex (Revere lead-coated sheet copper), 600 lbs. of Revere cold-rolled sheet copper, and 930 feet of Cheney Flashing were used in constructing the school building shown above.

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**- IN 2 WAYS**



● Many sheet metal contractors have been so well pleased with the working qualities of Toncan Iron that they have taken time to write and tell us how well it cuts, bends, punches, welds, etc.

Thus, Toncan Iron works well in two ways. First, for the contractor because it is softer than mild steel, exceedingly ductile and can be formed into any sheet metal commodity. Second, for the customer because it resists rust and corrosion better than any ferrous material in its price class — thereby lasting longer and saving money. Cold-working in the shop has no material effect on its high rust-resistance.

Why not take advantage of the superior working qualities and rust-resistance of this modern sheet metal — also the Republic advertising which carries the story of Toncan Iron to industry every month? Stock and use Toncan Iron — in black, galvanized or galvannealed finish. Write for complete detailed information.

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## AMERICAN ARTISAN

Volume 106 Number 4

### It's Your Move!

**T**HE time has come, we believe, for the progressive warm air, air conditioning contractor to give serious thought to adding apparatus which will make his operations a completely rounded out air conditioning business.

Up to now, most contractors have been content to sell winter air conditioning and have concentrated on furnaces, blowers, filters, controls, humidifiers and installation. A large number of contractors have been selling oil burning furnaces, either with or without matching oil burner. Others have been selling gas furnaces. Some have sold special stoker furnaces, permitting the owner to select the stoker which meets his fancy.

Too few contractors have given thought to summer air conditioning—in other words, cooling.

In the past year the trend toward a complete line of apparatus has been growing amazingly. Not only contractors, but the manufacturers, have been adding new apparatus so that today the progressive contractor can sell any phase of air conditioning the owner can afford to buy. During this year several outstanding furnace manufacturers have announced their own line of oil burners, stokers, compressors, coils, gas conversion burners, unit coolers and accessories.

This trend is logical, we believe, because the home owner prefers to buy complete air conditioning from one manufacturer or one contractor. This is as it should be. We believe that the home owner interested in air conditioning wants to get the complete picture from one contractor. The owner wants to know what air conditioning consists of, how much it will cost, how he can heat and cool and obtain all the other advantages air conditioning is claimed to give. It is confusing for the owner to find that he must talk heating with one contractor, cooling with another, automatic firing and fuels with still a third or perhaps an oil, gas and stoker salesman.

Worse yet, each of these salesmen pushes his particular apparatus and intimates that if his product is bought the other apparatus of air conditioning can be bought or not bought without serious harm.

As a result of this bombardment by many salesmen, the owner is in a quandary to know just what he needs. It is easy to understand why owners become thoroughly sold on a certain fuel and will not listen to cooling; or become all wrapped up in circulation and pay little heed to heating, humidification, etc.

We believe that the best possible sales procedure

is for the warm air heating contractor to lay before the prospect the complete picture of year round air conditioning, including all types of fuels and their firing apparatus, cooling, and accessory apparatus. The comparative merits of each piece of apparatus can then be explained without undue emphasis on any one system and a cost within the owner's limitations established.

Because we as an industry understand that fuels play an important role in final selection of the firing device we are in an excellent position to advise with the owner on the method of heating. Also because we know whether cooling is needed and can suggest several ways in which satisfactory summer comfort may be obtained, we can give the owner a complete outline of his needs and how much cooling should cost. We can also explain the relative importance and specific need for all the other functions of air conditioning which go to make up year round comfort.

The situation today may be likened to the early days of the automobile when the purchaser bought the car from one dealer and then added the accessories according to his preference. Today we do not think of buying the chassis from one dealer, the lamps, bumpers, horn, battery, etc., from others, but buy a complete car. It should be just as desirable to sell all the apparatus needed to air condition from one dealer who can then build up from the heating system according to the owner's needs and ability to buy.

We have established, in the last five years, the warm air heating contractor as the logical and preferred purveyor of air conditioning. We have advertised the fact that our industry fostered air conditioning and best understands its functions. We have declared that warm air, air conditioning is the most satisfactory system and that from warm air heating the owner may add piece by piece or at one time all the apparatus necessary to get year round comfort.

But we have failed to consolidate our position because we have permitted the specialty sales organization to put pressure on the owner to buy one item of apparatus oftentimes at the expense of the complete system which the owner originally had in mind.

The only procedure whereby we can make good our claim of air conditioning headquarters is for each contractor to carry the complete line and be ready to sell and install it.

# Fume Exhaust for Printing Presses

By R. F. Jeske

Milwaukee, Wisc.

The author of this article is a manufacturers' representative specializing in the design of ventilating, material separation and material collecting systems. His many years of experience in this work should enable him to write a series of case examples illustrating the many phases of this interesting activity. So far as possible each article will describe an actual installation in satisfactory operation.

**T**HE sheet metal contractor is frequently called upon to design and quote on systems to exhaust fumes, vapors, dust, dirt, etc., from machinery of such construction, that it is extremely difficult to apply hoods of the usual type.

The problem submitted herewith is in a printing establishment, running color printing presses and the ink used with the presses contains obnoxious and dangerous odors and fumes which must be removed.

Employees work on all sides of these presses so to merely exhaust the fumes by means of a fan placed in the wall or window of the press room will not answer the purpose, as by doing so, the fumes will be drawn over the workmen and their health will suffer.

## Catch Fumes at Source

A proper installation is to draw off the fumes where they originate. In this problem the ordinary type of hood cannot be used. The drawings show only the printing rolls and do not show the balance of the press parts, which are of such a nature as to prevent using a regular hood. Suction must be provided by means of so called nozzle intakes as shown in section "AA" and elevation "BB."

## Velocities Required

Let us assume an imaginary area over the printing rolls of three feet by two feet or six square feet. To move the fumes there must be maintained a velocity over this area of about 150 fpm. Multiply 150 fpm by the 6 square feet of area and we arrived at 900 cfm for each set of rolls. The printing rolls are about 30 inches long, except at press number 4 where the rolls are only 24 inches long. A velocity of about 3,000 fpm at nozzle intakes will be required to draw off the fumes from the area over the printing rolls. It is required to stay within 5HP motor requirements. Using a velocity of 2900 fpm through a nozzle intake of 30 inches by  $7\frac{1}{2}$  inches, we create about 900 cfm at each nozzle. The laws of the state where this job is located required a  $2\frac{1}{2}$  inch W. G. suction in branch pipes within 12 inches to 24 inches from hoods. As the nozzle would be considered the hood, we must create

this suction at about points 1, 2 and 3 of section "AA" and make the ducts leaving nozzles at this point 12 inches by  $2\frac{3}{4}$  inches.

## Reducing Operating Costs

Having satisfied the state law, we must now aim to reduce motor horsepower requirements and therefore we will increase size of ducts at points 1-A, 2-A, 3-A to 12 inches by 5 inches or a velocity of about 2200 to 2300 fpm. The square to round and the round branch leading to main suction pipe should also have a velocity of 2200 to 2300 fpm, making their diameters as shown on plan—8 inches, 12 inches, 15 inches and 15 inches. In the main suction pipes we can lower velocity to about 1700 fpm, making diameters 9 inches,  $16\frac{1}{2}$  inches, 24 inches and  $29\frac{1}{2}$  inches. The discharge pipe from blower should be about 28 by 28 inches having a velocity of about 1550 fpm and should be provided with an automatic louvred back draft damper. This will prevent cold air and weather from entering the system when blower is not running.

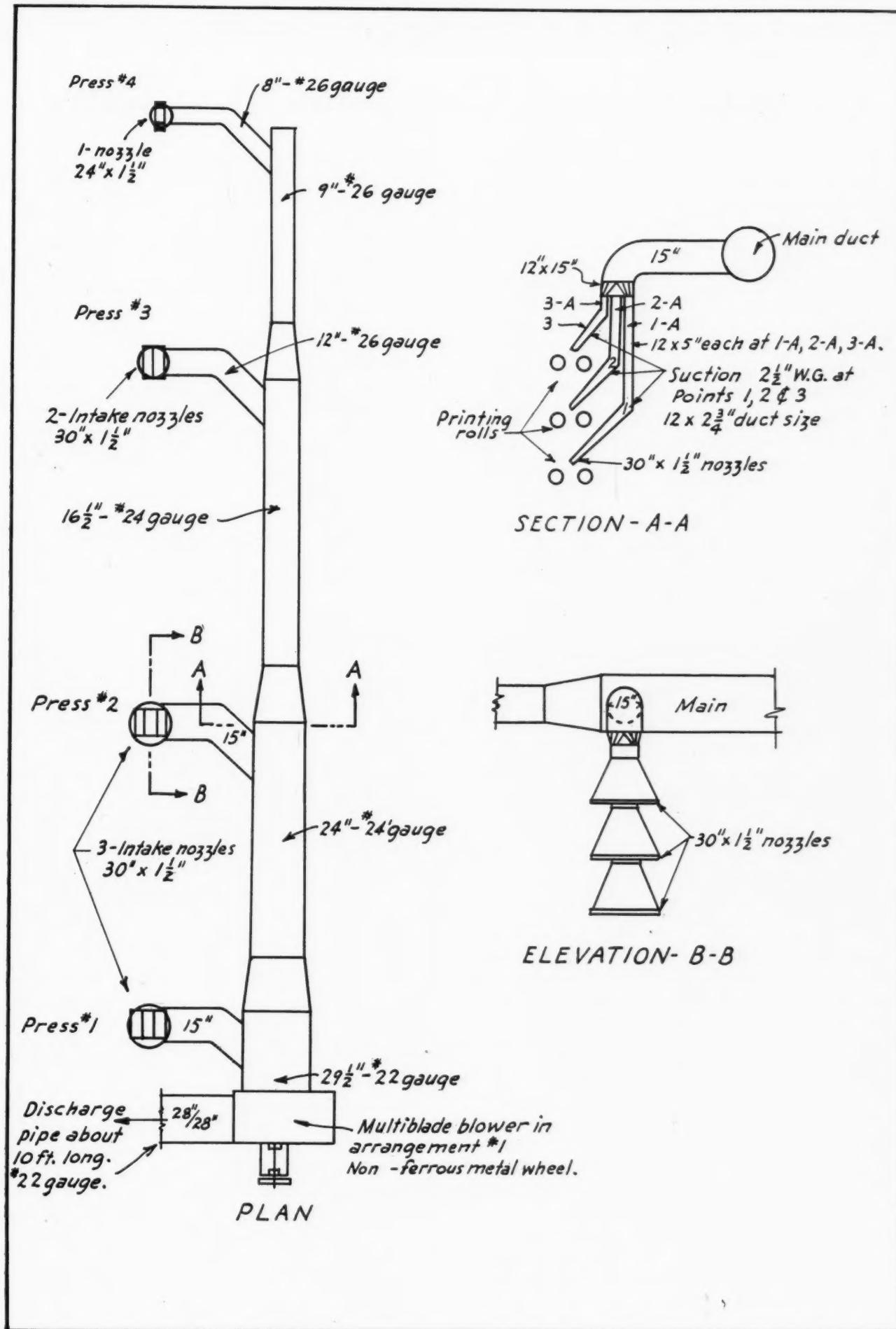
Calculation as given above and sizes given in sketches are based on taking in 900 cfm at each nozzle at presses numbers 1, 2 and 3 where nozzles are 30 by  $1\frac{1}{2}$  inches and 725 cfm at the one nozzle 24 by  $1\frac{1}{2}$  inches at press number 4. Or a total of 7925 cfm.

## Fans and Blowers

Exhauster or blower should be of the multiblade type and belt driven. Blades and all parts of wheel to be of non-ferrous metal to prevent possibility of fumes exploding and blower should be as shown in arrangement number 1, to keep bearings out of air travel. Motor will be 5 H.P. size and must have base rails to enable taking up stretch in belt.

Velocities in main suction pipes should be fairly uniform to obtain equal suction in branch ducts and diameters given on plan sketch are so proportioned.

Gauges of metal for the various duct sizes are given on plan and nozzles should be number 22 gauge, reinforced at inlet. All joints in suction pipe not grooved, to be riveted and soldered.



# An Analysis of State Unemployment Compensation Laws

**W**ITH information at hand indicating the early passage of a number of additional State unemployment compensation laws, the Social Security Board recently made public an analysis of the laws already adopted by 15 States and the District of Columbia and approved by the Board.

Approval of a State law gives the employers concerned, in accordance with the provisions of the Social Security Act, passed August 14, 1935, the right to deduct from their payments of the Federal pay-roll tax, up to 90 per cent, the amount of money they have contributed to the State unemployment compensation fund for employment as defined for purposes of the Federal tax.

## Status by States

Following are the States which now have approved unemployment compensation laws: Alabama, California, Colorado, Idaho, Indiana, Louisiana, Massachusetts, Mississippi, New Hampshire, New York, Oregon, Rhode Island, South Carolina, Texas, Utah, Wisconsin, and the District of Columbia.

Special committees are now studying the subject of unemployment compensation with the view to enactment of laws in Arkansas, Hawaii, Iowa, Kentucky, Michigan, Minnesota, Missouri, Montana, New Jersey, North Carolina, Tennessee, West Virginia, and Wyoming. Early action may be taken by the legislative bodies now actually or technically in session in Connecticut, Illinois, Ohio, and Oklahoma.

With the exception of that of Wisconsin all State laws now in effect were enacted in 1935 or 1936. The Wisconsin law was passed in 1932, and the workers in that State have begun to receive their unemployment compensation checks. In all other States having such laws, these payments will begin in 1938.

Regardless of the action of the States, all employers of eight or more persons now are subject to a Federal tax levied on payrolls. The Social Security Act provides for the setting up in the United States Treasury of an unemployment compensation trust fund from the State contributions from which the States will draw moneys for the payment of the compensation benefits.

The Federal tax is fixed at 1 per cent of the wages paid by employers in 1936, 2 per cent in 1937, and 3 per cent in 1938. Although the Federal law makes no provision for a tax on employees, approximately half the States build up their unemployment compensation funds by levies upon both employer and employee.

## Type of Fund

In most of the unemployment compensation laws the Board's analysis shows that the "pooled-fund" type has been adopted, although Indiana has a combination of that type and that of the employer-reserve account. Wisconsin is the only State with a straight

employer-reserve account type in which each employers' contributions are credited to his individual account and from which benefits are paid only to his former employees.

The "pooled-fund" type provides for a pooling of all contributions in a single undivided fund from which benefits are paid to eligible employees, irrespective of their former employers.

## Employers Concerned

The tax levied on employers by the Social Security Act applies only to employers of 8 or more workers and a majority of the States follow this coverage in their own laws. In New Hampshire, New York, Oregon, Rhode Island, and Utah the State law provides for the levy of the tax on employers of 4 or more. The District of Columbia law and, after 1936, the Idaho law apply to employers of one or more.

In all States, except the District of Columbia, New Hampshire, New York, and Wisconsin, the employing firm must have had the specified number of workers on its pay rolls for at least 20 weeks. In New York and New Hampshire the period is fixed at 13 weeks, in Wisconsin, 18 weeks, and in the District of Columbia, employment for any period makes the employer subject to the law.

## Contribution by Employers

Provision is made in most States for contribution by an employer of 0.9 per cent in 1936; 1.8 in 1937; and 2.7 in 1938, 1939, and 1940. After 1940, most of these laws provide for a merit rating, that is, a provision enabling the employer to obtain low rates based on his record for stabilized employment.

In the District of Columbia, New Hampshire, and New York the rates are 1, 2, and 3 per cent through the years 1936, 1937, and 1938 and thereafter. In Wisconsin the rate is fixed at 2 per cent through 1937, becoming standard thereafter at 2.7 per cent.

## Contribution by Employees

Eight States require contributions by employees immediately or in 1937. These States are Alabama, California, Idaho, Indiana, Louisiana, Massachusetts, New Hampshire, and Rhode Island. No contributions by the worker are required in the other jurisdictions.

The rate paid by employees in California, Idaho, Massachusetts, and New Hampshire is one-half of the employer's rate, although in Massachusetts it will be 1 per cent in 1937; in New Hampshire after 1936, 1 per cent not to exceed one-half of the employer rate; and in California after 1937, 1 per cent not to exceed one-half of the employer rate.

A straight 1 per cent rate is provided for in Alabama. The rate in Louisiana is 0.5 and in Rhode Island 1 per cent on salaries up to \$3,000 in 1938 and thereafter at 1.5.

The District of Columbia law is the only one providing for a contribution from government funds.

### **Merit-Rating System**

Thirteen laws provide for merit rating of some kind and three States, Mississippi, New York, and Rhode Island, are now studying such a plan. Merit rating is the term used to describe the reduction in rate of employer contributions when it can be shown that they have operated their plants in such a manner as to stabilize employment.

### **Benefits**

All States provide that the benefits to be paid shall be 50 per cent of the wages, up to \$15 a week, except the District of Columbia. The District of Columbia law provides for an amount equal to 40 per cent of the wages plus 10 per cent for a dependent husband or wife and another 5 per cent for each dependent relative, with a maximum of 65 per cent.

The minimum weekly amount which may be paid varies, the highest being that of Rhode Island, \$7.50.

Provision is also made for benefit payments for partial unemployment in all States except Massachusetts and New York.

### **Waiting Period**

A worker must have been unemployed for some time before he can collect benefits. Alabama, the District of Columbia, Idaho, Oregon, Rhode Island, and Wisconsin provide a waiting period of three weeks of total unemployment within the past 52, though in Wisconsin the period must be for one employer. In New York the waiting period is three weeks, but not more than 5 weeks are required within any calendar year. Indiana, Mississippi, South Carolina, Texas, and Utah require a waiting period of 2 weeks of unemployment within the 13 weeks preceding payment of benefits. California requires a waiting period of 4 weeks of unemployment until 1940 and thereafter three weeks, while working for the same person, within twelve months. Massachusetts requires 4 successive weeks in 52; Louisiana requires 4 weeks within the 52. New Hampshire requires 3 successive weeks and has alternate provisions to cover certain circumstances.

For partial benefits no waiting period is required in California, Idaho, Louisiana, Mississippi, South Carolina, and Texas. Other States require the same period as for total unemployment except in Wisconsin, where, in order to get benefits for partial unemployment, a man must have had one week of such unemployment while working with a given employer within the past 52 weeks.

### **Ratio of Benefits to Period of Employment**

In all States how long an unemployed man may collect benefits depends upon his previous employment records. Most of the States provide that the worker may receive one week's benefits for every 4 weeks he was employed in the 2 years preceding the date of his unemployment and for which he has not collected any benefits. Some States also provide for benefits of one week for each 20 weeks of employment within the

5 years preceding the worker's unemployment and for which he has not collected benefits.

There are, however, certain maximum periods for the payment of ordinary benefits prescribed by all laws. Alabama, the District of Columbia, Massachusetts, New Hampshire, and New York provide for a period of 16 weeks within the year. The Rhode Island law is the most liberal, providing a maximum of 20 weeks of benefits. Idaho is the second most liberal with 18 weeks. Included in the 15-week group are Indiana, Louisiana, Oregon, and Texas. Utah fixes 14 weeks as the maximum, California 13, and Mississippi and South Carolina 12.

The Wisconsin law provides a sliding scale for benefits of that State which stipulates that 4 weeks of employment shall be counted for 1 week's benefits, when the benefit amounts to \$10, and 5 weeks of employment for 1 week's benefits when the rate of benefits is \$12.50 and 6 weeks of employment when the rate of the benefit is \$15 a week.

### **Length of Employment**

To be eligible for benefits, employees must have worked a certain period of time during the previous year. Twenty-six weeks of employment within the 52 preceding a person's unemployment is a prerequisite in Alabama, California, Idaho, Oregon, and Rhode Island. However, as an alternate provision, employees in Alabama, Idaho, Oregon, and Rhode Island, after they have worked 40 weeks in the past 104, will be eligible. The District of Columbia, Louisiana, Mississippi, South Carolina, and Texas require only 13 weeks of employment within the previous year. Indiana requires 20 weeks, and Utah 16. Massachusetts requires 90 days (or 13 weeks) of employment within the 52 weeks previous or 130 days (or 19 weeks) within the 104 previous weeks. New York, likewise, requires 90 days' employment within the preceding 12 months or 130 days within 24 months. A Massachusetts employee who has drawn benefits for the maximum number of weeks in one year must have had 8 full weekly contributions paid in his behalf in order to draw benefits in a subsequent year. New Hampshire requires only 60 days of employment; and Wisconsin 4 weeks of employment by the employer from whose reserves he draws benefits.

### **Employment Exclusions**

In general, the State laws follow the provision of the Federal tax on employers of 8 or more in excluding certain employments, such as agricultural labor and domestic service in a private home, although there are a number of notable deviations. In Alabama, South Carolina, and Texas, insurance solicitors and agents are excluded. Alabama further excludes railroad employees who are in interstate commerce and subject to the Railroad Labor Act, while Wisconsin excludes employees of railroads in interstate commerce.

The District of Columbia, New Hampshire, New York, and Wisconsin laws omit the general exclusion of maritime workers. New Hampshire is the only State that specifically excludes nurses and physicians attached to hospitals.

(Continued on Page 113)

# The Warm Air-Fan System of Heating and Ventilating for Churches

By Platte Overton  
Chief Engineer, The Furbo Co.

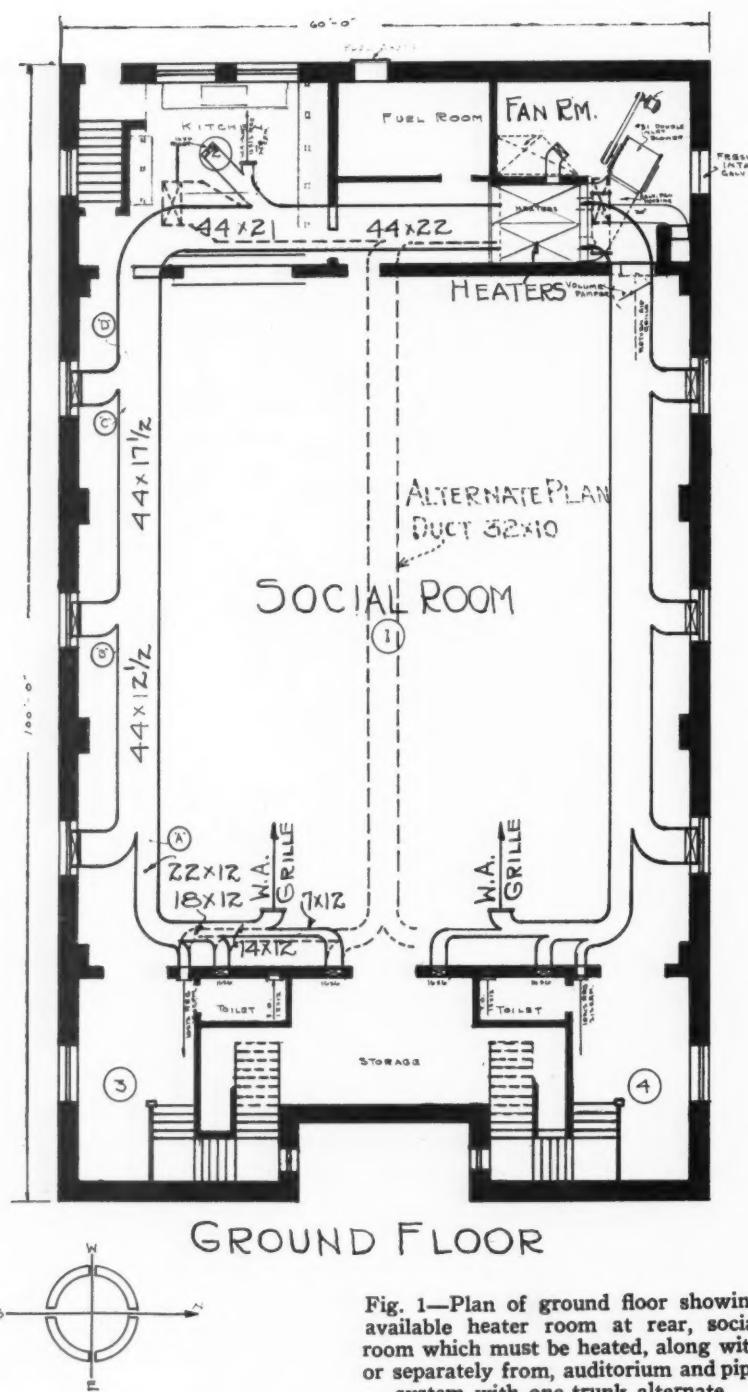


Fig. 1—Plan of ground floor showing available heater room at rear, social room which must be heated, along with or separately from, auditorium and pipe system with one-trunk alternate.

In the November and December issues the author presented a discussion on systems for churches. In this article he lays out the ducts and sizes them to equal friction, locates the returns and determines the capacities of the apparatus.

THE ducts are sized by the use of the charts in Figs. 8 and 9. To use these charts we proceed as follows. We have 7,211 c.f.m. in a 34-inch round pipe. Our first branch is to rooms 2 and 102, and has a total of 428 c.f.m. 428 is 6 per cent of 7,211 approximately. We locate 6 per cent on the left hand side of Fig. 8, and move to the right until we intersect with the 34-inch diameter of main pipe line and hence to the top of the chart where we find the diameter of our branch is 11 inches. For the continuation of our trunk line we have 100 minus 6 equals 94 per cent of a 34-inch trunk line. We find this 94 per cent on the left hand side of Fig. 9 and following the same procedure as before, we find that we have 94 per cent of a 34-inch duct equals a 33-inch duct with 7,211 minus 428 equals 6,783 c.f.m.

We deliver 10,800 c.f.m. to the auditorium through six registers or 1,800 c.f.m. each. Our next branch has 1,800 c.f.m. and is 26½ per cent of 6,783 or a 19½-inch branch. 73½ per cent of 6,783 equals 73½ per cent of a 33-inch duct equals a 29-inch duct for the continuation of our main trunk duct.

The balance of the system is sized in the same manner. See Table 1, page 25. The charts all give the size in round ducts and these are changed to the equivalent rectangular ducts for equal pressure loss per linear foot by the use of the standard rectangular to round for equal friction chart.

Our grilles in the auditorium are

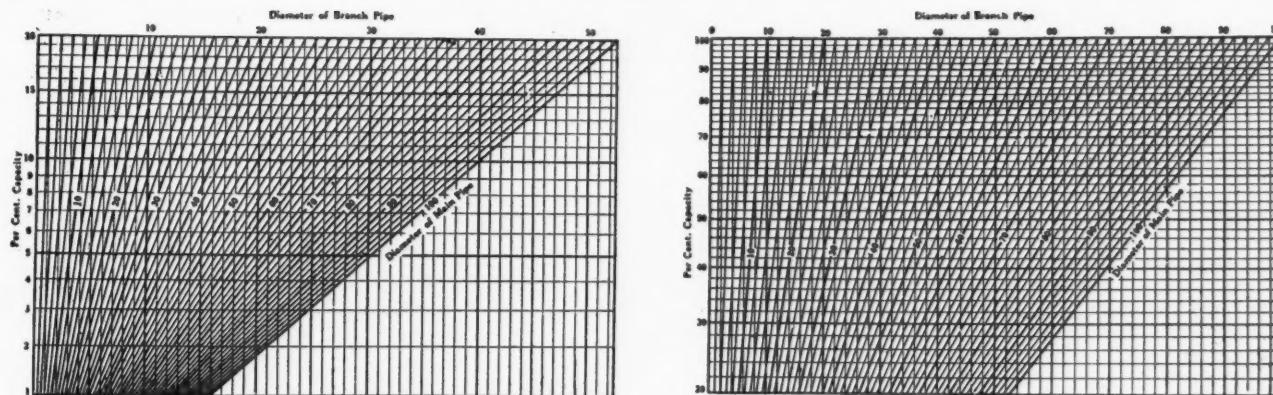


Fig. 8 and Fig. 9—Charts for main and branch pipes for equal friction per foot of length. Fig. 8—1 to 20 per cent. Fig. 9—20 to 50 per cent. For accurate use these charts should be at least 8x12 inches or larger.

sized for a 400-foot velocity. 1,800 divided by 400 equals  $4\frac{1}{2}$  sq. ft. or grille  $36 \times 18$ . The grilles are equipped with deflectors to force the air out over the heads of the occupants. The warm air registers in all other rooms are 7 ft. 0 in. above the floor line and may be designed to velocities of 300 to 600 feet per minute. The longer the blow, or the farther the air must travel to reach the wall opposite, the higher the velocity. For example: the register in the social room may have a 600 foot velocity. Those in rooms 3 and 4 a 300 velocity.

These grilles may be of ornamental iron wire with channel or

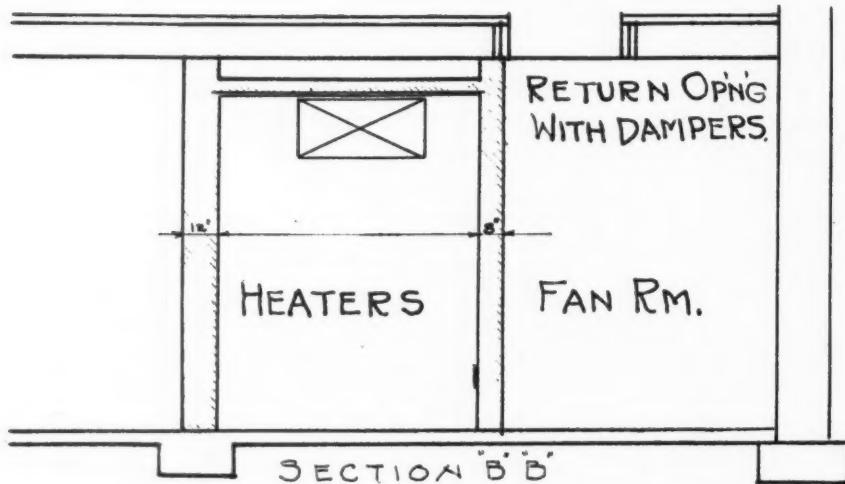
Table I—Duct Sizing Tabulation

7211 c.f.m. in 34" duct.
428 c.f.m. = 6 % of 7211 = 6 % of 34 " duct = 11 " duct with 428 c.f.m.
6783 c.f.m. = 94 % of 7211 = 94 % of 34 " duct = 33 " duct with 6783 c.f.m.
1800 c.f.m. = 26½% of 6783 = 26½% of 33 " duct = 19½" duct with 1800 c.f.m.
4983 c.f.m. = 73½% of 6783 = 73½% of 33 " duct = 29 " duct with 4983 c.f.m.
1800 c.f.m. = 36 % of 4983 = 36 % of 29 " duct = 19½" duct with 1800 c.f.m.
3183 c.f.m. = 64 % of 4983 = 64 % of 29 " duct = 24¼" duct with 3183 c.f.m.
1800 c.f.m. = 56½% of 3183 = 56½% of 24½" duct = 19½" duct with 1800 c.f.m.
1383 c.f.m. = 43½% of 3183 = 43½% of 24½" duct = 17½" duct with 1383 c.f.m.
250 c.f.m. = 18 % of 1383 = 18 % of 17½" duct = 9 " duct with 250 c.f.m.
1133 c.f.m. = 82 % of 1383 = 82 % of 17½" duct = 16 " duct with 1133 c.f.m.
345 c.f.m. = 30 % of 1133 = 30 % of 16 " duct = 10 " duct with 345 c.f.m.
788 c.f.m. = 70 % of 1133 = 70 % of 16 " duct = 14 " duct with 788 c.f.m.
465 c.f.m. = 59 % of 788 = 59 % of 14 " duct = 11½" duct with 465 c.f.m.
323 c.f.m. = 41 % of 788 = 41 % of 14 " duct = 10 " duct with 323 c.f.m.

**DATA SHEET**  
Based on -10° F. Cold Weather & Prevailing Winds From N.W.  
Church

Rooms No.	1	2	3	4	101	102	103	104	105	106	Totals
<b>USE</b>											
Social	Kitchen	Hall	Hall	Audit,	Hall	Choir	Men	Women	Foyer		
56x60	16x18'	11x18'	11x18'	56x60	9x16	9x16	14x18'	14x18'	27x13'		
X 11'	X 11'	X 11'	X 11'	X 23'	X 9'						
36960	3165	3078	3078	108000	1296	1296	2268	2268	3159		
SW 20%	SE 10%										
SW 20%	SE 10%										
5.5 %											
<b>EXPOSURE FACTORS</b>											
Based on -10° F. Cold Weather & Prevailing Winds From N.W.											
Exposure Factors											
Archt.											
Expt.											
<b>MEASUREMENTS</b>											
1. Room Dimensions	12'-9"	12'-9"	12'-9"	12'-11.8"	12'-9"	12'-9"	12'-9"	12'-9"	12'-9"	12'-9"	
2. Cube Foot Space	221-18.16	221-18.16	221-18.16	221-18.16	221-18.16	221-18.16	221-18.16	221-18.16	221-18.16	221-18.16	
3. Room Floor Area	132	42	16	16	2.88	16	32	16	16	16	
4. Floor Const. & Factor	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
5. Ceiling Const. & Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
6. Window Const. & Factor	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
7. Wall Const. & Factor	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
8. Exposed Sash and Door Perimeter, equiv.	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
9. Leakage B. t. u. per ft. of Perimeter	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
10. Expd. Wall Gross Area	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
11. Expd. Window Gross Area	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
12. Expd. Wall Net Area	1.254	1.25	2.75	2.75	4.220	2.61	2.60	2.70	2.70	2.70	
13. Exposure Directions	S.E.N.	W.	S.E.	N.E.	N.E.S.W.	S.W.	S.W.	S.E.	S.E.	E.	
14. Room Temperature	10°	10°	10°	10°	10°	10°	10°	10°	10°	10°	
<b>HEAT LOSSES</b>											
15. Wall Loss B. t. u. per Hr.	15445	7200	3473	3473	14619	4376	5811	4116	4176	1580	
16. Window Loss B. t. u. per Hr.	11520	3456	1420	1420	14538	1420	3840	3840	3840	3064	
17. Subtotal Loss B. t. u. per Hr.	26965	3466	5393	5393	180057	6226	5651	5016	5016	5164	
18. Expos. Allow. B. t. u. per Hr.	5393	1648	539	1617	36017	1259	3480	801	2400	1933	
19. Floor Loss B. t. u. per Hr.											
20. Ceiling Loss B. t. u. per Hr.											
21. Leakage Loss B. t. u. per Hr.											
22. Total Heat Loss	45558	11560	1532	1532	81037	9155	16335	10417	12016	19557	
23. Deduct for Heater Size	16600	3200	800	800	14960	800	1600	800	800	4000	
24. Heater Building-loss Load	38958	9460	6732	7810	356972	8355	14731	9617	11216	13599	47948
<b>SERVICE</b>											
25. Air Supply C. F. M.	930	240	250	285	10800	188	335	345	400	650	14423
26. Recirculation C. F. M.	562				10022	14	311				11369
27. Air Supply Inlet Temp.	120	120	100	100	1014	120	120	100	100	100	
28. Air Supply B. t. u. Service											
29. Direct Radn. B. t. u. Service											
30. Direct Radn. sq. ft.											
31. Grav. Ind. Radn. sq. ft.											
32. Aspir. Coils Radn. sq. ft.											
33-factor page	4896	4896	30.5	30.5	4896	4896	30.5	30.5	30.5	30.5	

Fig. 4—This data sheet will be used for all the types of large structures discussed in this series. The needed information is arranged so that any one complete item can be seen for all rooms or any total of items can be found quickly.



angle iron frames or they may be flat stamped steel grilles. The cost estimate sheets are all based on the use of ornamental wire grilles with black japanned registers, where registers are shown. All return grilles are designed for a velocity of 300 feet per minute.

There are no returns from the front of the building and no vent ducts are provided except for the two toilet rooms on the ground floor. However, it is planned to use part outside air on this installation. This will prevent the infiltration from being too high in the foyer and front of the building. The provision for a liberal supply of outside air tends to set up a slight pressure inside the building and effects an exfiltration rather than an infiltration in rooms that have no returns.

#### Outside Air

Our outside air is provided through a window on the ground floor into the fan room. This window is protected from the weather by galvanized louvers and is pivoted from the top to "float" open or closed as the fan runs, or is shut off. (See Fig. 6). The return from the auditorium is drawn through the grilles in the face of the pulpit and an opening in the ceiling of the fan room Fig. 10. This opening in the ceiling should have some manner of volume dampers, door or slides for control of the volume of air. If too large a volume of air is returned from the auditorium it will tend to pull the outside air through the foyer when the outside doors are opened and cause a cold draft across the auditorium floor.

Fig. 10—Cross section of fan room showing return opening in fan room ceiling. Grille is in face of the pulpit. (See Fig. 1 and Fig. 6.) Suitable dampers for shutting off this return should be provided.

Fig. 6—Arrangement of apparatus in heater room. The entire room acts as a gathering chamber for return air. The register for the social room is at the left center.

The social room, on the ground floor, has a return grille at the floor line into the fan room. This grille should have a volume damper also.

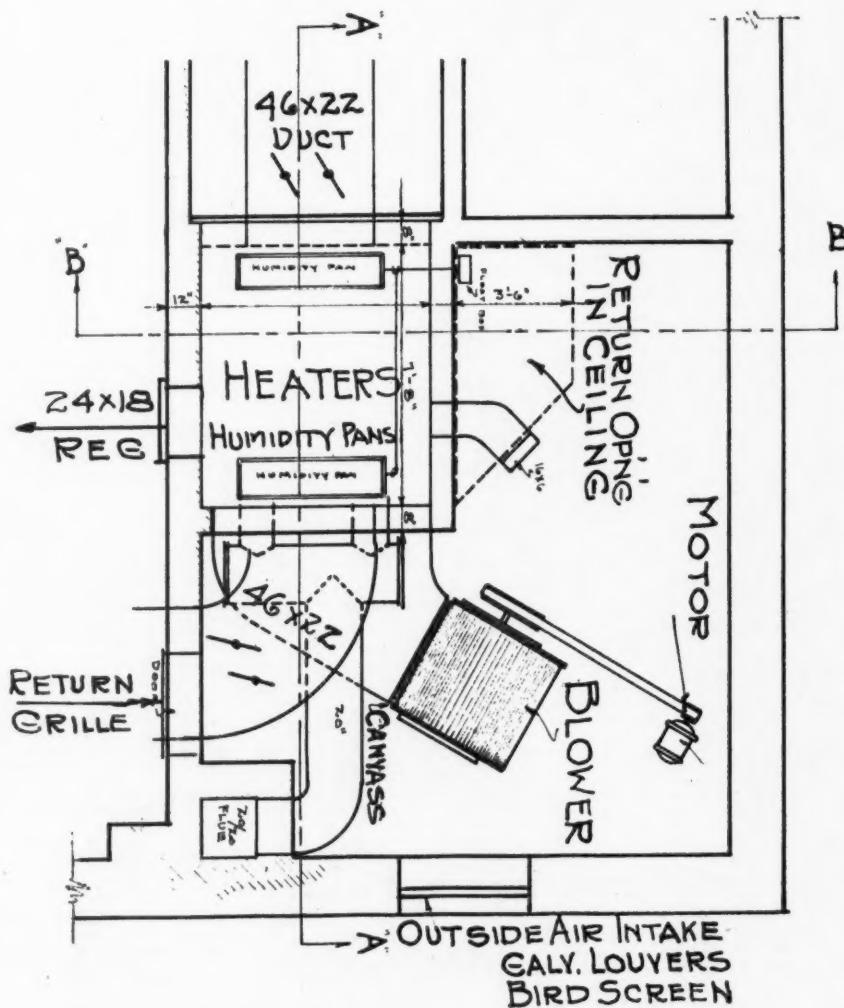
To select the heater size, we must know the combustion rate and grate area. Before we can calculate these items we must determine the amount of fuel burned per hour. Our formula is:

(Total c.f.m.  $\times$  60  $\times$  .068  $\times$  .24  $\times$  temp. rise, intake to final temp.) divided by 7,200.

We have all the figures for the equation except the temperature rise. We know that the final temperature is 120, but we have a mixture at the fan inlet of inside and outside air or air at 60 degrees and air at -10 degrees.

The recirculated air is determined and filled in for item 26 on the data sheet. The average register temperature from the rooms with recirculation is 100 degrees, and the average temperature of this

(Continued on page 110)





Mr. Jos. G. Dingle  
Ottawa, Illinois  
Dear Sir:

We note in our last American Artisan that we can ask you questions on the Social Security subject.

This is what we would like to know.

Myself (the father) and two sons are associated in business handling Warm Air Furnaces—Stokers, Sheet Metal—Repair Work, etc.

Both sons live at home and all the profits from the business go into one account. I (the father) am past the age of 65 years. Can we specify an allowance to each son per week as his wage earned and pay the Social Service assessment on that amount? We do not see any reason why the sons cannot be employees of the firm. We have numbers for both sons.

Give us your opinion on this.

Yours truly,  
Signed E. C. W.  
◆

We are pleased to receive your letter of the 18th, making inquiry on the subject of the Federal Social Security Act. At first reading, your letter presents only a single question—that of the application of the Old Age Benefits Tax, and the benefits expected to flow from such taxes. But the matter is really not so simple as it appears.

You state that you and your two sons are associated in business; that the sons live at home and all the profits of the business goes into one account; and that you are past 65 years of age. In the absence of anything to the contrary, we shall assume that your sons are partners with you in the business, owning some equities in the property of the business, and participating in the profits.

Instead of the simple matter of answering your question as to the Old Age Benefits section of the Federal Social Security Act, we shall point out and discuss the possible effect of your position on your Federal Income Tax liability; the matter of the Gift Taxes imposed by the Federal Government; the possibility of additional costs at your death of the Federal Estate and State Inheritance taxes; and the possibility that even though we ignore all these possibilities and place your sons in the position of employees, deduct from their compensation the required Old Age Benefits Taxes, and you pay your part thereof, they may not be entitled to an Old-Age Annuity.

#### The Federal Old-Age Benefits Tax

If your sons are employees, they must come under the Old-Age Benefits Tax; you must withhold the required percentage of their wages, and pay the amounts withheld, together with the required percentage payable by you, to the Collector of Internal Revenue at the times stated. But

By Joseph G. Dingle  
C. P. A., Ottawa, Ill.

are they employees? You state they are associated with you in the business under the firm name of E. C. W.— & Sons. That would seem to indicate a partnership and in that case, they, as well as you, are employers under the terms of the Federal Act and are not employees. There is no provision in the Act whereby employers may come under the alleged benefits of the Old Age Benefits section.

#### The Income Tax Question

How have you been reporting your income for the purposes of the Federal Income Tax? Are you reporting as a partnership, or as an individual? If as a partnership, the income of the business is distributed to the three of you according to the terms of the agreement, and you and each of your sons report on that part allocated to each on the partnership return. Assuming that you are a married man, living with wife and having no dependents, as defined by the Revenue Act, you would have a specific exemption of \$2,500.00. Assuming that your sons are single, they would have the exemption of \$1,000.00 allowed single persons. Thus the income tax liability of the business as a partnership would be divided among the partners in their respective interests, while as an individually owned business, you would be entitled to deduct as business expense, the salaries paid your sons, and you would be required to pay income taxes on the net income of the business. Personally, it appears to us that the partnership arrangement would be much more economical in the matter of income taxes.

#### Federal Estate and State Inheritance Taxes

Of course, we do not wish to say that when one reaches the age of 65, he is ready to shake off the mortal coil and go to the happy hunting grounds. But the fact remains that when one has reached that age, he should give some thought to the disposition of his estate; taking such steps as may be possible to avoid the incurrence of unnecessary taxes on his estate. We have no means of knowing the amount of your estate, but in view of the fact that both the Federal and State laws make liberal exemptions, and assess light taxes on small estates, it will be found advisable to keep one's estate in the lower brackets if it be at all possible. If your sons own a part of the business, that part will not be included in your estate at your death.

#### Federal Gift Taxes

There is now a Federal Gift Tax, and this stands in the way of making gifts in substantial amounts. This tax has been on the Federal Statute Books since 1932, and prior to 1926. There was, however, a period from 1926 to 1932 when there was no gift tax law and any gifts made within that period would not be subject to tax. Gifts made now in amounts of \$5,000.00 or more to any one person in any year are required to be reported to the Federal Authorities.

#### Sons as Employees May Not Be Eligible for Old Age Benefit

Let's assume that for reasons sufficient unto yourself, you should decide that you want your sons to be employees, rather than partners, and treat them as such, paying them wages, deducting from their wages the required percentages; paying a like amount yourself, as is required under the Act. Let's assume further that they will earn in ex-

(Continued on page 112)

# Theory and Application of Resistance Welding\* [Part 2]

By L. H. Frost

Welding Engineer

Electric Controller & Mfg. Co., Cleveland

## Timing Up to Operator

UNTIL the advent of motor-driven machines the timing was left to the discretion of the operator, who judged the completion of the weld by the appearance of heat indicated by a change in color of the surface in contact with the electrode. In the desired form of welding, the heat generated by the inner surfaces does not reach the outer surfaces in sufficient amount to cause discoloration. This is, however, modified to some extent by the thickness of the piece and the size of the weld.

The above condition will, in general, require short welding intervals. Fast-operating motor-driven machines have been able to make welds excellent in appearance and strength, but the lack of easy adjustment limited to some extent the obtaining of the best results for varying types of materials. This indicated that a separate device for controlling the time of current application was desirable, and resulted in the weld-timing control, of which there are several makes and types available.

## Adjustments for Heat, Pressure, Time

The spot-welding machine then is provided with three adjustments which may be readily made. These are:

(1) Heat adjustment, obtained in steps by heat regulator.

(2) Pressure adjustment, obtained by adjusting spring, air or hydraulic pressure.

(3) Time adjustment, obtained from observation, length of motor-driven cam-operating pilot switch, or by adjustment of timing control.

In addition to these are adjustments not so easily obtained, such as (A) Electrodes—size, shape and material.

(B) Electrode arms—spacing and length.

A knowledge of these adjustments, their limitations and effect on welding conditions, will help in determining whether or not a certain job can be done in a certain machine and also whether or not the welding operation can be materially improved for a given job. To show the effect of these adjustments, it is advisable first to consider them in their general effect on the thermal gradient of Fig. 3, and then discuss the adjustments to be made for different materials and alloys.

The heat adjustment is made by operation of the heat regulator. This regulator changes the ratio of primary to secondary voltage, which for a given condition of work-pieces will produce a change in current. All machines, except perhaps some special-purpose machines, have a range of current adjustment of at least 4 to 1, and some makes have ranges as high as 16 to 1. In general, the low-kva. machines (up to 15 kva.) have a range of 700 to 3500 amperes in the secondary, medium-kva. machines (up to 35 kva.) have a range of 1200 to 7500 amperes, while machines of larger rating or for special purpose may have much higher currents available. In all cases, however, it is advisable to

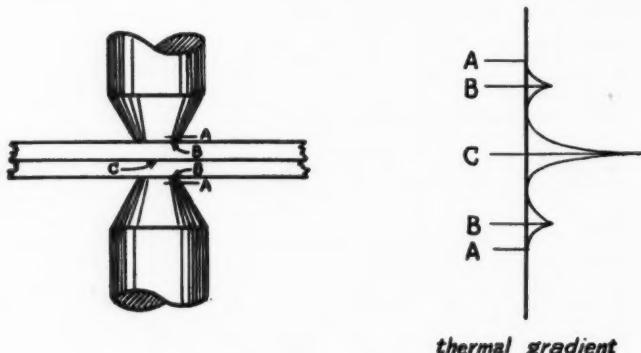


Fig. 3. Spot-Welding Set-Up and Initial Temperature Curve

measure the current. This may be done by measuring the primary current and multiplying by the ratio of primary to secondary voltage. Most machines have from eight to sixteen heat points.

## Pressure Varied by Spring

Pressure adjustment on manually operated machines is made by changing the compression of a spring, located either at the rear of the machine or in the movable head. On low kva. machines the range of adjustment is generally from 20 to 200 lb. total pressure. For medium-kva. machines this range is, in general, from 50 to 500 lb. total pressure. Large machines have correspondingly higher pressure ranges, but these are modified by the type of welding the machine has been designed to perform. Where the pressure adjustment is not calibrated as is often the case, a pressure meter should be used to determine the actual pressure. The most

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common form of pressure meter consists of two sealed diaphragms connected to a suitably calibrated pressure gauge. Pressure exerted on the discs by the electrodes (without current) is indicated on the gauge.

The pressure adjustments of motor-driven machines are similar to those of manual machines, but the pressure ranges are somewhat higher.

Air and hydraulic machines have direct-reading pressure indicators, calibrated by multiplying the area of the piston in square inches by the gauge pressure. The pressure adjustment is obtained by a reducing valve and is continuously adjustable throughout the pressure range. The range of pressure for these machines depends, of course, upon the diameter of the cylinder and the line pressure, and may be readily calculated for any machine.

In the case of both manual and motor-driven machines, the pressure is often left at one value and never adjusted because of the inconvenience of making this adjustment. The pressure adjustment is very important, however, and care should be given to this adjustment, in order to obtain the proper value.

#### Resistance Decreases with Increased Pressure

Reference to Fig. 3 reveals that the resistance of the surfaces in contact depends upon the pressure forcing the surfaces together, as well as the surface condition and the conductivity of the material. This is because the surface is not smooth enough to have perfect contact. The amount of surface in contact is determined, for a given condition, by the pressure.

As the pressure is increased, the resistance decreases, and for a given condition of the work-pieces, the decrease in resistance will require a greater current to develop the same amount of heat in the same time interval. The decrease in resistance will allow more current to flow, but this effect is small compared to the variation in pressure possible. It might appear desirable to decrease the pressure and thus increase the resistance and the heat generated at C. This, however, causes discoloration or deterioration of the outer surfaces. Further, it is necessary to force the pieces together after fusion has taken place, and too low a pressure would not accomplish this, but would result in a porous and weak weld.

It will be evident that there is one point in the pressure range at which best results are obtained. This is particularly true of some of the alloys. In the welding of mild steel, this range is rather broad, which accounts for the satisfactory results being obtained without careful pressure adjustment.

The time adjustment has received more discussion in the last few years than any other adjustment. This has been brought about by the advent and use of timing control units which have been made available by several electrical-control-equipment builders. Without doubt, the judging of a satisfactory weld by the operator is a slow and variable process.

#### Operation by Motor Drive

In those cases where manually operated machines have been used successfully in fast production, the success of the operation depended upon the skill of the operator in duplicating time intervals. Further, manual machines are limited to low pressures, due to the fatigue of the operators when on fast production. The motor-driven machine is an improvement in that it is possible to obtain higher pressures and a regular time interval in production. However, the inconvenience of obtaining time and pressure adjustment has led to the widespread use of the heat regulator as the only regular adjustment.

The importance of timing control is brought out by a further consideration of the thermal-gradient curve shown in Fig. 3. As the current is allowed to flow for a longer interval the peaks disappear as fusion occurs at C and as softening of the surfaces at B causes fuller contact. Further, heat is absorbed by the work pieces and electrodes, which also helps to reduce the peaks. The penetration of the weld is determined by the length of the time interval and the rate of absorption of heat by the pieces. It is evident that for a given condition of current, pressure and work-pieces, the penetration of the weld can be controlled by the time of current application. It is possible to weld so that when the work is removed from the machine the outside surfaces are cold, and heat is felt only after an interval sufficient for it to travel to these surfaces.

#### Select Electrodes for the Specific Job

The electrodes, another important factor, should be adjusted or selected for the individual job. Electrodes of various materials and shapes are available, some being hard and of various copper alloys. The preferred electrode would be hard and have a resistance less than copper. At present, all hard alloys have a resistance greater than copper, which means that more heat is generated between the surface and the electrode than when copper electrodes are used. The shapes available are, of course, infinite, and the effect of the shape will be discussed in a later article. The electrodes, however, should be chosen for the job, and it is possible to effect in some cases great improvement in welds by use of proper electrodes.

In most shops, the operator is permitted to dress the electrodes with a coarse file. Few men are experts with a file, and the practice of operators dressing electrodes in place is probably the greatest single cause of excessive surface indentation and burning. This may be eliminated by using electrodes which have been properly dressed in a lathe, and replacing when contact surfaces show signs of wear.

The physical position of the electric circuit of the secondary has some adjustment. In all machines the electrode arms may be adjusted for space. The lower arm is usually raised or lowered to accom-

(Continued on page 109)

# Treatment of Galvanized Sheets for Painting\*

By J. L. Schueler

Superintendent Steel & Wire Division,  
Continental Steel Corp.

**T**HE subject of this paper involves methods for preparing zinc-coated (galvanized) sheet surfaces to hold paint, varnish, lacquers, enamel and similar coatings. No attempt will be made to go into the relative merits of paints, enamels and lacquers, or their subsequent treatment after application, nor will we go into the preparation of uncoated sheet surfaces.

The primary function of the zinc coating is to seal the steel sheet from air and moisture with a layer of highly impervious material which, itself, is sufficiently resistant to corrosion to have a reasonably long life. A secondary purpose of the zinc coating is to divert corrosion from the steel by electro-chemical action. Other things being equal, a *thick* coating of zinc will protect the steel for a longer period of time than will a *thin* coating. However, heavy zinc coatings on sheets are usually brittle and cannot be used where severe fabrication is involved.

Paint, enamel or lacquer is used on the galvanized surface either for decorative purposes, or to retard the action of those elements which tend to promote corrosion.

Although steel, itself, in many localities does not long resist the effects of atmospheric corrosion, yet no other economically available metal affords the necessary physical properties such as strength, rigidity and workability. On the other hand, zinc is probably the best of the economically available coating metals for steel, which afford resistance towards atmospheric corrosion conditions. Zinc, however, lacks the desirable physical properties possessed by steel. Hence, with steel to furnish the necessary physical properties and an adequate protective coat-



ing of zinc to furnish resistance to corrosion, a galvanized steel sheet has the best qualities of both.

Galvanized sheet surfaces present two types — first, the ordinary smooth greasy - feeling spangled sheet, and, second, the grainy, matte-surfaced, non-spangled galvannealed sheet. The greasy feel of the spangled sheet is not due to grease, because in the manufacture of the galvanized sheet no oil, grease, soap, or similar material, normally comes in contact with it.

## Types of Sheets

Galvanized sheets are used to fabricate products for indoor or outdoor use. Galvanized sheets may be further classified into those used for manufacturing purposes and those used for building construction. By far, the greatest number of sheets is used for the latter purpose.

The painting, enameling or lacquering of galvanized sheets may be considered as falling into three

classes; first, for decorative purposes and indoor use only; second, for outdoor exposure; third, combinations of the first two.

We know from experience that paints and the like will not adhere to spangled galvanized sheets, unless the surface has been prepared for the purpose either artificially or by aging. The galvannealed sheet, on the other hand, having a matte surface needs no preparation, per se, for painting. However, any galvanized surface before painting should be free from grease, oil, or foreign material and should be dry. Even then, the spangled galvanized surface must have been further prepared by an etching treatment, which may be either chemical or mechanical. In the chemical class fall the displacement agents, such as the copper or antimony salts; the acids, such as hydrochloric and acetic; aging, or weathering action, involving both chemical and mechanical etching, and, in fact, any solution which will dissolve zinc. In the second class may be considered, scouring, abrasives and sand blasting. The object of all etching treatments is to produce a matte-like surface to act as a key, or bond, for the paint.

## Solvents

One of the oldest of the treatments for etching galvanized surfaces involves the use of antimony chloride dissolved in gasoline, turpentine or some other non-acid solvent.

For use, the antimony chloride solution is swabbed over the sheet and allowed to remain until dry. The blackened sheet is then washed thoroughly and allowed to dry. The paint is then applied.

## Sal Soda, Copper

A method recommended by the A. R. E. A. is to wash the sheet

\*Address delivered at 18th Annual Meeting, American Zinc Institute, Inc., St. Louis, Missouri, April 21, 1936.

with a solution made up of one pound of sal soda dissolved in three gallons of water. The sheet is allowed to dry for twenty-four hours before applying the paint.

### Copper Etchants

Copper salts also form the basis for solutions to be used for etching zinc surfaces. Copper acetate, copper chloride, copper nitrate and copper sulfate are all used for this purpose. From four ounces up to one pound per gallon of water, of any of these salts is recommended by various users. One formula recommends the use of a solution made up of one pound of copper sulfate crystals dissolved in a gallon of water. Upon drying, the surface is thoroughly washed with water to remove the black deposit. This is continued until a white cloth rubbed over the surface, shows no black smudge.

Acetic acid (vinegar) is also used as an etching medium. The surface to be treated is swabbed with a weak solution of either vinegar or acetic acid. This is followed by a thorough washing with water and then allowing the sheet to dry before applying the paint.

### Hydrochloric Acid

Many formulas recommend the use of hydrochloric acid. This is a dangerous material to use on a zinc coating. Its action is violent and not always uniform and, in the hands of an unskilled operator, may cause untold damage to the zinc surface. However, when used in a weak solution it is probably no worse than any other acidic chemical etching medium. Acids may dissolve the coating in spots and attack the steel base, whereas copper or antimony salt solutions act on the zinc coating only. Two formulas involving the use of hydrochloric acid are:

1. \*Dissolve 12 ounces copper chloride, 12 ounces copper nitrate and 12 ounces sal ammoniac in  $4\frac{1}{2}$  gallons of water; then add 12 ounces

by weight of hydrochloric (muriatic) acid.

2. \*60 parts by volume denatured alcohol.

30 parts by volume toluol.

5 parts by volume tetrachloride or ethylene dichloride.

5 parts by volume hydrochloric (muriatic) acid.

Since all of these solutions must remove some zinc in order to etch the surface, they should be used carefully and with caution. If the sheet is not thoroughly washed following the application of these etching solutions some of the material may remain on the zinc surface and later cause the paint to lift off. This is especially true of acidic etchants, even though they be neutralized by the zinc. This comes from the fact that a break in the paint coating allows moisture to enter, and when an electro-chemical action is set up by hydrogen, gas may form under the paint film and lift the paint from the sheet.

### Scouring

Scouring with fine mesh abrasives, steel wool, or even weak sand blasting, is much more preferable for the preparation of galvanized surfaces for painting, than the chemical methods used, because there is no danger of an "after" action. Here too, the sheet should be thoroughly washed and dried before painting to get the best paint adherence, because scouring, and sand blasting, leaves on the zinc surface unadherent films of finely divided material.

Sheets intended for outdoor exposure should not be painted when erected, unless it is absolutely necessary. It is better to allow these sheets to "weather" until they have become etched, or at least until the surface no longer has the greasy smooth feel. This will take up to a year or more from time of erection depending on the location. For heavily coated sheets, say a two ounce coating on a 28 gauge sheet (Seal of Quality type) the sheet may be exposed several years before painting. "Weathering" involves both chemical and mechanical etching, in that the galvanized surface exposed to the atmosphere is first oxidized, or carbonated, and

these films being cyclicly removed by rain and wind, causes the surface of the zinc to become roughened.

Galvannealed sheets, as was mentioned before, have the "etched" surface as an inherent part of their manufacture. Consequently, before applying paint, enamel, varnish, lacquer and the like, all that is usually necessary for preliminary surface preparation is to remove grease, oil, finger marks or foreign material.

### To Remove Grease

Many solutions are available for this purpose and may be used either on galvanized, or galvannealed sheets. The basis for these materials may be alcohol, gasoline, carbon tetrachloride, soaps, sodium carbonate, bicarbonate, hydroxide or metasilicate, borax, trisodium phosphate, and many others. High pressure steam is also used in some cases. Sometimes the cleaning and etching agents are used together as is illustrated by the antimony chloride-gasoline solution, or the alcohol-toluol, etc. solution mentioned previously.

In closing, we just want to recapitulate certain precautions to be observed in the preparation of galvanized surfaces for painting:

1. Wherever possible allow the sheet to age or "weather" before applying the paint.
2. If you can't do that, then use mechanical etching.
3. If you have to use a chemical etchant, then be very careful that its action is not too strong. Avoid the use of acids, since it is not necessary that acids be used. A neutral solution of copper sulfate, or antimony chloride is better than an acid solution and just as effective.
4. Be sure the zinc surface is clean and free from foreign material before applying the paint. If the sheet has rusted, clean off the loose rust by brushing, before applying the paint.
5. Do not paint a wet or moist, zinc surface if you expect to get the best life from the paint.

1. \*Private communication from G. F. Welker—The Glidden Co.

2. \*Private communication from E. W. McMullen—The Eagle-Picher Lead Co. and J. A. Frederickson—J. A. Masury & Son.

# The Ohio Convention

**T**HE 1937 annual convention of the Ohio State Sheet Metal Contractors' Association, held March 16, 17 and 18, in Cleveland, introduced convention innovation in the adoption of a one-day program plus one-half day of business and two evenings for entertainment.

On the evening of the 1st day the mayor of Cleveland, H. H. Burton, welcomed members of the association to Cleveland and the salesmen's auxiliary staged a very excellent series of amateur boxing bouts featuring local Cleveland winners of the Golden Gloves Tournament and a buffet supper.

At the annual banquet Dr. John L. Davis of New York City, one of the country's outstanding after-dinner speakers, held more than 300 guests in mirthful suspense for over an hour as he related one interesting or humorous story after another. In addition to Dr. Davis, five acts of music, dancing and singing were presented by spectacular entertainers.

## Value of Associations

Opening the one-day program, Frank L. Myers of Owens-Illinois Glass Company, Toledo, speaking on "The Value of Your Association," declared that it is regrettable that such a topic must be presented to the men who already know the value of association membership and convention attendance as signified by their attendance and could not be presented to the hundreds of Ohio contractors who for one reason or another did not attend and do not see the value of local or state association membership. To indicate what is being done by some active associations, Mr. Myers cited the case of a baker's meeting in Chicago, where 1,700 bakery engineers out of a total of 2,200 engineers in the United States came from every state in the country, also Mexico, Cuba and Canada, to discuss for five days one single topic; namely how to increase the consumption of bread.

Mr. Myers pointed out that these engineers are not fighting among themselves. Nor do they consider their secrets too valuable to discuss, whereas in our industry too many men labor under the impression that the things they know must be kept a dark secret, although probably every one else in the industry knows the same thing.

## 12 Months Work a Year

The speaker asked those attending to recall the period in which the tin shop did a twelve-months-a-year business in heating, sheet metal contracting, and general metal repair work. Apprentices were trained continuously and the young man interested in sheet metal work could be assured of twelve months work a year. Then all this changed and

contractors began specializing in sheet metal, ventilating or warm air heating with the result that due to weather conditions the mechanic ceased to have twelve months work a year and was reduced to six to eight months work a year. The result has been that young men were not anxious to enter the industry, so the industry today finds itself without adequate apprentices.

Mr. Myers declared that residential and small commercial air conditioning is bringing back twelve months work a year with the contractor now able to do winter air conditioning in the winter months and summer air conditioning during the summer, filling in as he can with sheet metal, roofing, metal products fabrication and other work now coming into active operation.

To prove the value of association membership Mr. Myers called attention to the situation in Michigan where the State Association is securing the refund of thousands of dollars in sales tax payments made by contractors and collected from home owners; also to the work of the Ft. Wayne association where an acute condition exists relating to jurisdiction over plumbing and electrical wiring; and to the bill now in the New York State legislature which would set up an examining board in each chief city to say who shall install air conditioning systems. This board, as outlined in the March issue of American Artisan, was to consist of two employing or master steam fitters, two journeymen steamfitters and one mechanical engineer. The speaker emphasized how dangerous such an examining board might be in communities where warm air, winter air conditioning is the predominating system. Mr. Myers also pointed out that labor is organizing and while this in itself is not necessarily dangerous, it does indicate that labor relations will shortly be of vastly more importance than they are today and only strong or active associations can be expected to uphold the needs of the employer.

## Social Security

John W. Bankhurst of the Commerce Trust Company of Cleveland explained briefly Titles 8 and 9 of the Social Security Act and further explained that the first detailed report on unemployment compensation is due April 1. Mr. Bankhurst explained that there is a satisfactory compensation insurance and old age benefit law now effective in Ohio and that therefore only 10 per cent of the tax payment goes to Washington and the other nine-tenths of each one percent is paid into the State treasury. The speaker also explains Forms SSI and 940 as presented several times previously in American Artisan, and pointed out the importance of properly filling in these forms and sending them in by the proper due date. The speaker emphasized that

while unemployment compensation returns are mailed monthly only as lump sum payments, accurate records by the hour, day, piecework or other forms of compensation must be kept in order for the contractor to properly return the report which is mailed on April 1st of this year and must be returned quarterly thereafter.

The speaker also pointed out that on unemployment compensation, the Ohio law now covers all shops employing three or more as compared to the Federal law of eight or more and that therefore many Ohio contractors who are not subject to the tax under the Federal law are subject to the tax under the Ohio State law. The speaker expressed as his personal opinion that whereas some of the various titles of the present act may be declared unconstitutional or radically revised, all industry should accept the fact that some form of social security must be expected from now on.

#### Business Problems of 1937

Edwin A. Scott, editor of Sheet Metal Worker, speaking on "What Makes the Difference?" declared that in his estimation the sheet metal contractor or warm air heating dealer is no less of a salesman than contractors of other similar industries. Asking "Why do some contractors succeed where other contractors fail," Mr. Scott declared that one difference lies in each man's attitude toward business. In other words how serious each individual is. Expressing the belief that the industry is now entering one of the most prosperous eras ever experienced, Mr. Scott declared that the coming few years will decide whether or not this industry exists as a furnace and air conditioning industry or becomes simply sub-contractors for others who will do this work.

The speaker also pointed out that it was relatively simple to conduct a sheet metal or furnace business years ago and the contractor then did not have so many things to consider as have employers today. The matter of taxes was cited as one example. Also the great increase in merchandising activities and the need for contractors to be good salesmen as well as good mechanics. Also air conditioning has brought in new businesses and business men who see in air conditioning a quick means to profit. Many of these new entrances into residential and small commercial air conditioning do not know the first thing about the industry or the science.

Mr. Scott declared that whereas some years ago there were three distinct means of distribution; namely, the factory branch, the independent dealer and the mail order house, and that whereas the factory branch and the mail order house years ago were the greatest competitor of the independent dealer, today the factory branch and mail order distributor is facing the problem of trying to make eight months heating work cover twelve months of operation. The independent dealer is in a more strategic situation since he can sell summer cooling, winter air conditioning, sheet metal contracting, ventilating, specialty item fabrication, and other

activities as the means of securing twelve months of work each year.

#### New Technical Code

At the afternoon sessions devoted principally to discussions of air conditioning, Bruce F. McLouth, engineer, Dail Steel Products Company, presented the new mechanical warm air heating code. Mr. McLouth explained briefly the history of the gravity code and the older mechanical warm air heating code and pointed out the limitations of these two codes and the reason why a new code was considered necessary. The basic reason for the new code, declared Mr. McLouth, is the need for setting up a minimum regulation to eliminate or reduce the poor design and installation work now all too prevalent.

Mr. McLouth explained how heat losses are determined from pages of heat loss coefficients both for conductivity and conductance and explained that these coefficients are taken largely from the 1936 edition of the ASH&VE GUIDE. The speaker also pointed out how heat loss coefficients for heterogeneous wall constructions may be calculated if such a construction is not given in the coefficient of the new code or as a coefficient in the GUIDE.

Mr. McLouth pointed out that one of the important sections of the new code refers to the problem of proper selection of register temperature, and explained the relationship between register air temperature and air change. He pointed out that whereas five or six air changes in an uninsulated house might require a register air temperature of 135 or 140 deg., the same register air temperature in a properly insulated house will result in a greatly reduced number of air changes, and that five or six air changes are absolutely necessary to eliminate stratification and to provide adequate ventilation. This means that lower air temperatures will have to be used in houses which are insulated and this in turn requires a different selection of register faces, register location, register air velocity, as well as register air temperatures.

#### Air Change and Register Temperature

Mr. McLouth explained how this relationship of register air temperature, house construction, and cfm can be quickly solved by the use of charts presented in the new code.

For example, a house with 20,000 cu. ft. of space and six air changes requires 120,000 cu. ft. of air per hour. 120,000 cfh divided by 60 equals 2,000 cfm. Then by use of formulas and charts as presented in the new code, 2,000 cfm divided by the Btu heat loss from the house equals factor called Q. Working back from the cfm formula which is

$$cfm = \frac{1}{.24 \times d (t_1 - t_2) \times 60} \times Btu$$

it is seen that  $cfm = Q \times Btu$  and  $Q = \frac{cfm}{Btu}$

Knowing the Q factor we can then determine either the cfm at the preselected register air temperature or the register air temperatures at preselected cfm.

Pointing out the importance of considering temperature drop in ducts, Mr. McLouth showed a diagram of a furnace with several registers off one trunk line, explained how the register air temperature is selected for one register mid-way in the trunk line and then corrected for registers closer to the furnace or farther away from the furnace by adding or subtracting one-quarter of one degree of temperature drop per foot of actual length of the duct.

In explanation, if the farthest register is 60 feet from the furnace, we would have  $\frac{1}{4} \times \frac{1}{2}$  of 60 equals  $\frac{1}{4} \times 30$  equals  $7\frac{1}{2}$  deg. If the register 30 feet from the furnace (the half way register) calls for 135 deg., we calculate that the register 60 feet from the furnace will show  $127\frac{1}{2}$  deg., and not the 135 deg. which was selected as average.

#### Do We Really Air Condition?

Following Mr. McLouth, J. D. Wilder, editor of American Artisan, declared that after listening to the explanation of the new code the time was opportune for consideration of the question "Do we actually air condition?"

To point out wherein the industry actually does not do air conditioning although claiming that it does, the speaker gave as one of the first violations the matter of inadequate or improper consideration of cold wall and glass areas. Tracing a small diagram on the blackboard, the speaker explained how a thermometer in the middle of a room at breathing level may show satisfactory room temperature, whereas a person sitting adjacent to the cold wall or to large windows will experience a sense of chill, due directly to the body radiation toward cold walls. Further increases in room temperature in the center of the room are not a satisfactory answer to cold walls or cold glass areas.

#### Cold Walls Are a Problem

The speaker suggested that more intelligent locations of warm air registers is the answer and explained how the proper location of warm air registers may be used to eliminate cold wall or cold glass areas. The locating of high sidewall registers facing windows and the use of velocities high enough to carry the stream of warm air to the outside or cold wall and drop the warm air stream over the window; or use the registers located in the plane with the cold windows and selected to throw a stream of air along the cold wall; or the location of registers beneath windows with low velocities so that the stream of warm air will float up the glass surface were suggested as three methods for overcoming cold walls.

Other rooms frequently overlooked as a source of

trouble from cold walls was declared to be the dining room which year by year is growing smaller with the result that when more than the family is present at the table, some persons are very close to cold glass areas and also basement recreation rooms where low temperatures may be satisfactory when play activities are in progress, but are entirely unsatisfactory when persons are sitting quietly.

A second problem demanding consideration, was said to be the floor draft. Draft was declared to be of two types, that resulting from too high velocities of warm air and the draft from cold air moving across the floor. The speaker stated that warm air drafts or blasts were seldom encountered unless a serious miscalculation or absolute ignorance was the reason for the difficulty, whereas cold air drafts across the floor are sometimes found in the best of designs. These drafts may be due to high and low pressure areas within the house, air moving down stairways and finding no return near at hand; warm air pipes reversing themselves and becoming cold air returns when the cold air supply is inadequate or resistance high; drafts caused by infiltration of air which moves across the floors to a return and sometimes to the just plain cussedness of floor draft.

#### How Many Returns?

Mr. Wilder pointed out that some engineers are advocating the use of fewer and larger cold air returns and very frequently no returns whatever from the second floor while other engineers are advocating the use of returns from every room. Declaring that he did not wish to suggest one blanket answer to the controversy, the speaker stated he believed this must be answered by each contractor for the

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individual job depending upon past success with few or many returns and depending further upon the amount of money which the home owner wishes to spend.

(Continued on page 114)

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(Continued on page 114)

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# RESIDENTIAL AIR CONDITIONING SECTION

We began publication in the March issue of the new Technical Code for Design and Installation of Mechanical Heating Systems. Part two of the code appears in this issue. As stated, we are not publishing all the tables and reference data.

... In order to show a direct application of this new code, we will publish after completion of the code proper, the house plan used at the Michigan State College short course and explain step by step how the code should be used.

... Almost 200 men attended this Michigan State College short course. They came from thirteen states and Canada. For four days these men worked from early morning to midnight learning all about mechanical heating and cooling. We should like to publish the course just as it was presented, but such is impossible. However, we will cover most of the course in presenting this typical problem.

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WATERLOO AIR CONDITIONING REGISTERS

# Air Conditioning REGISTERS

## The Register-of-the-Year!

*... Leads in beauty, mechanical features, sales and profits*

All those extra qualities the public demands today are now combined in Waterloo's new 'Venetian blind effect' registers. That is why Waterloo dealers have a real sales 'edge' on competition. These features SELL — advanced styling, rich distinctive beauty, modern straight-line simplicity . . . plus definite mechanical superiorities\*. No wonder leading architects, builders and decorators are specifying Waterloo Air Conditioning Registers. No wonder heating men are registering steady gains in business when they sell from the Waterloo line.

\* Slanted louvres which reflect light and color, conceal the ducts—Complete adjustable control of air flow (90-degree range) — Positive lock mechanism — Tested capacities.

### Waterloo Register Co.

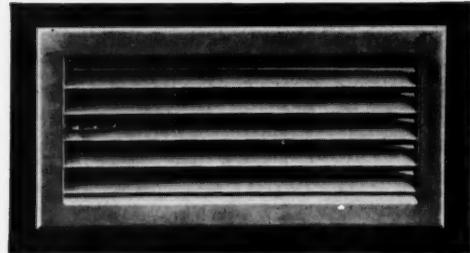
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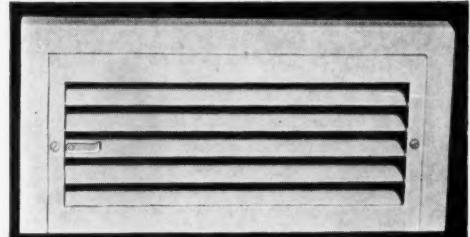
In New York City—Air Conditioning Utilities, Inc.,  
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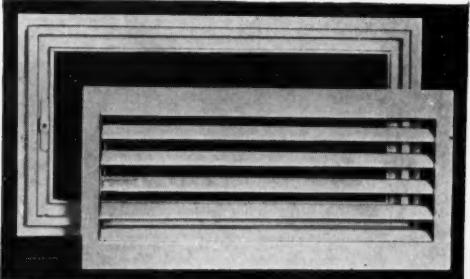
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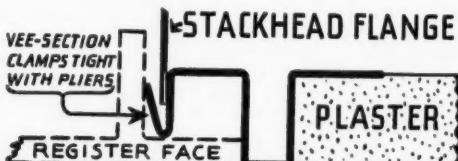
FH-100—Adjustable one-piece Venetian Type Register for walls.



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FH-102—Venetian Type adjustable register for walls, with Vee-U plaster frame.



The Waterloo Vee-U Frame assures positive, tight connection with stack-head.

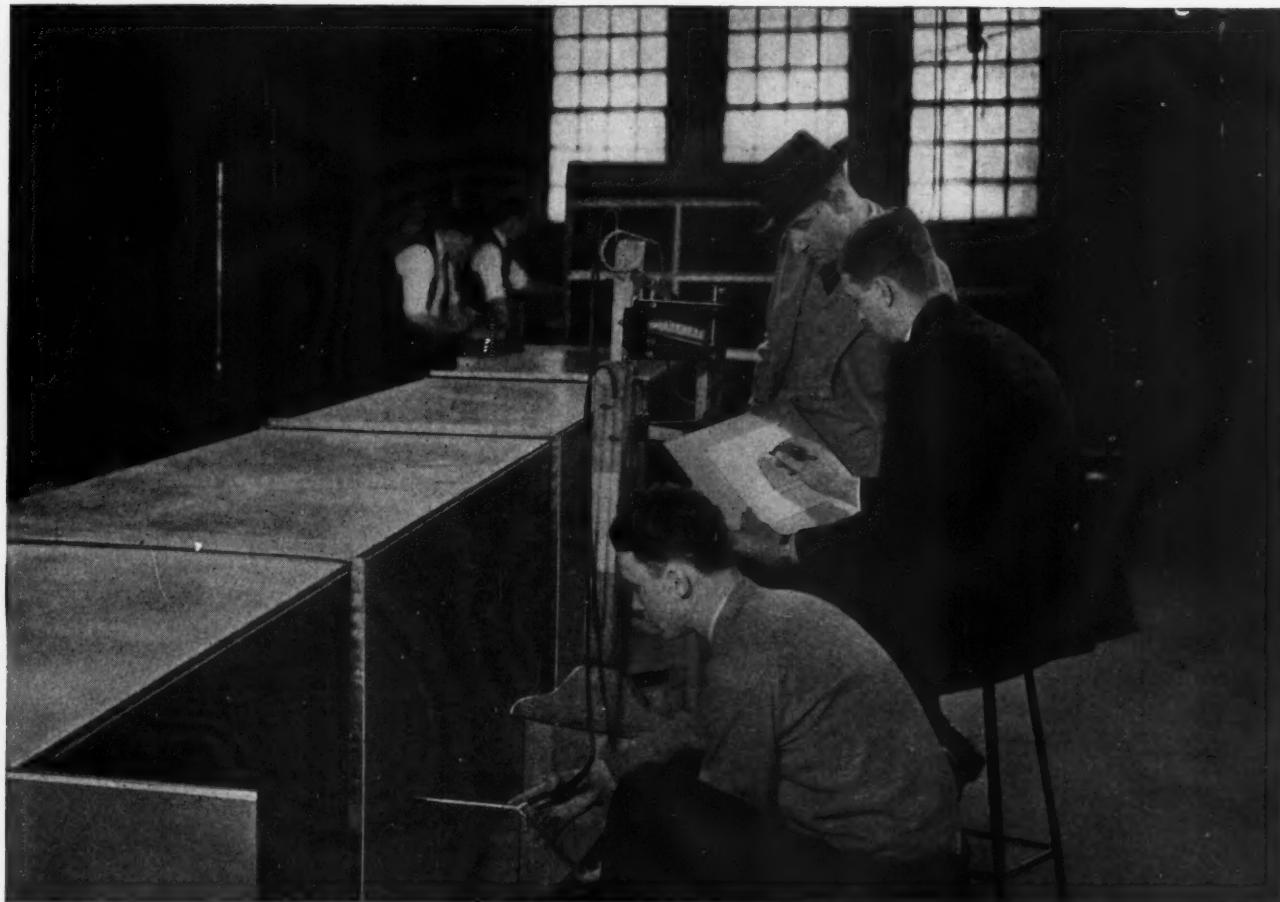
Waterloo Register Company  
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Send new catalog of Waterloo Registers, with new designs, new charts and installation data—with no obligation.

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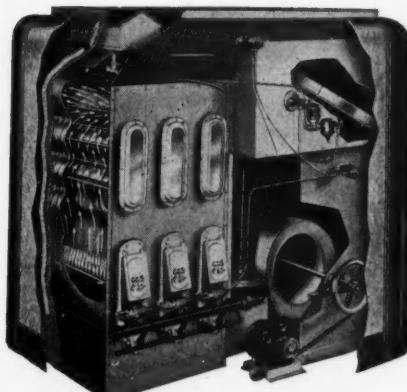
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H. P. Mueller, president, watches engineers testing deliveries of Mueller Air Conditioning Furnaces and Climator Blowers.

## WHEN CLOTHES MAKE THE MAN



**MUELLER GAS ERA CLIMATROL**

This complete gas-fired winter air conditioning system brings a distinct advance to home heating. Illustration above is cut-away view of insulated cabinet showing compactness and accessibility of every Mueller element. Note fire travel through Gas Era Steel furnace sections; powerful fan which circulates pure, filtered, moistened, warm air to all room; and complete assembly of conditioning units and controls.

OF course, clothes really don't make the man any more than a stylish casing makes a good furnace. Yet that statement has survived a good many years of repetition.

The real man is found *within* the dress of good-grooming. But the man has to prove himself by his acts, not his dress. When my dad first pointed this out to me, he didn't say "acts," however, he called it character.

And when I took over, here at the Mueller Furnace Company, I soon discovered the application of this truth, insofar as heating equipment is concerned. I learned that heating equipment, like men, must first of all have character if it hopes to survive in public favor. Character to give service; character that can be depended upon. And that character must start with the ideals—the principles of the men who

run the business. It's time enough to consider attractive dress, after true worth has been established.

And we've considered attractive dress in our new line of heating and air-conditioning equipment. Don't doubt that for one minute. People tell us our 1937 line is the smartest in the industry. But, more important to us, is the fact that they also tell us the new line has the fine character which enabled Mueller products to out-perform those which are built down to a price.

See the new Mueller line of coal, oil and gas fired furnaces and boilers. Discover the opportunities it offers for fast profits. Come to Mueller for true facts about home air conditioning equipment. Write today for Catalogue AA-4.

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AMERICAN ARTISAN  
RESIDENTIAL AIR CONDITIONING SECTION

April, 1937

# THE LATEST WORD IN

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There is no longer any valid reason for using unmatched controls . . . Thermostat and Humidistat. The "Genuine Detroit" Two-Eleven Thermostat and No. 197 Humidistat represent the finest in modern styling. Their decorative treatment and finish is the same, and when mounted side by side on a dual mounting plate, they add a distinctive touch to any well planned modern interior.

Both instruments are highly sensitive and deadly accurate. Both are constructed for long

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The Two-Eleven is available either with or without compensation (Pre-heater). Both types are available in all models for heating, cooling, night and day, summer and winter, and for three wire circuits.

The No. 197 incorporates the extremely sensitive Friez element recognized throughout the industry as the most effective and durable available

• Write for Technical Bulletins 86 and 39. •

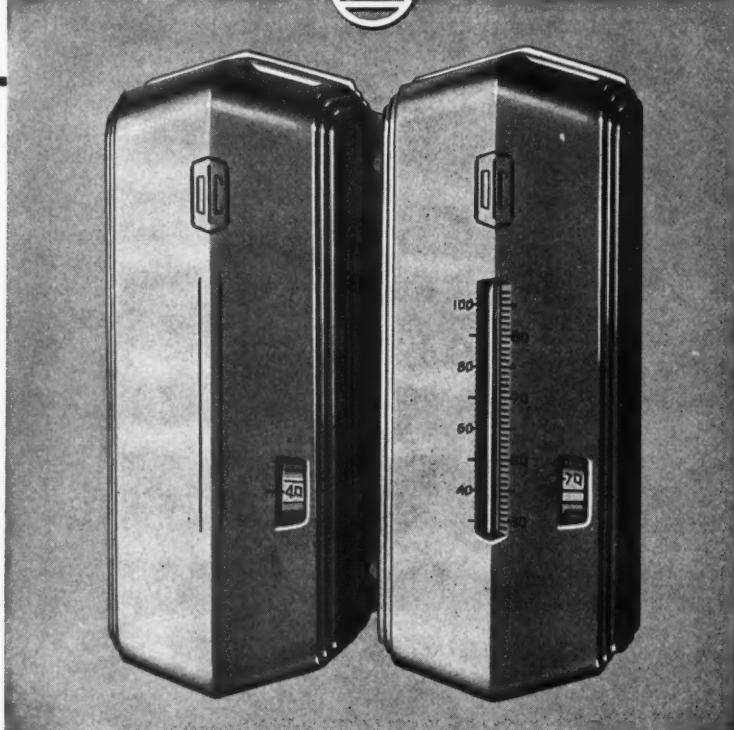
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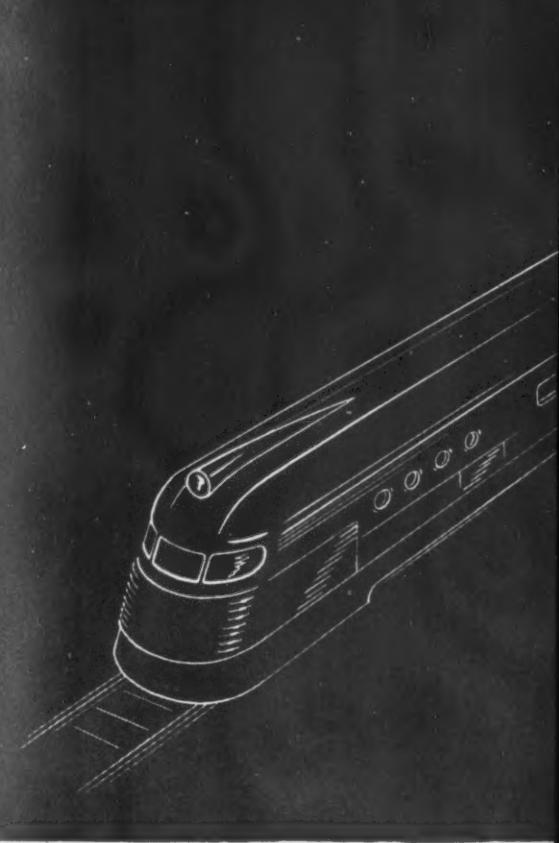
Division of American Radiator & Standard Sanitary Corporation

Canadian Representative—Railway and Engineering Specialties Ltd., Montreal, Toronto, Winnipeg



# MONCRIEF

## *now leads the Style Parade*



### *Newly Designed*

### Air Conditioning Units are Proving the Sensation of the Year

 New beauty—new features, new high efficiency...Now Moncrief dealers can attain new high sales with the advantages provided by these modern Moncrief air conditioning units, made in specialized types for coal, gas or oil.

Look the whole air conditioning world over and you will find nothing that offers so great a combination of sales-compelling features

as Moncrief presents in its newly styled line. In all heating history, no firm has ever taken such an advanced step...re-designed its entire line of air conditioning units at one time.

Moncrief's new designs open up new markets with greater sales and profit possibilities for Moncrief dealers. You, too, will do well to take advantage of the new line and lead in the profit parade for 1937.

THE HENRY FURNACE & FOUNDRY COMPANY

# PAYNE "A" GAS VENT

**NON-CORROSIVE . . . INSULATING**

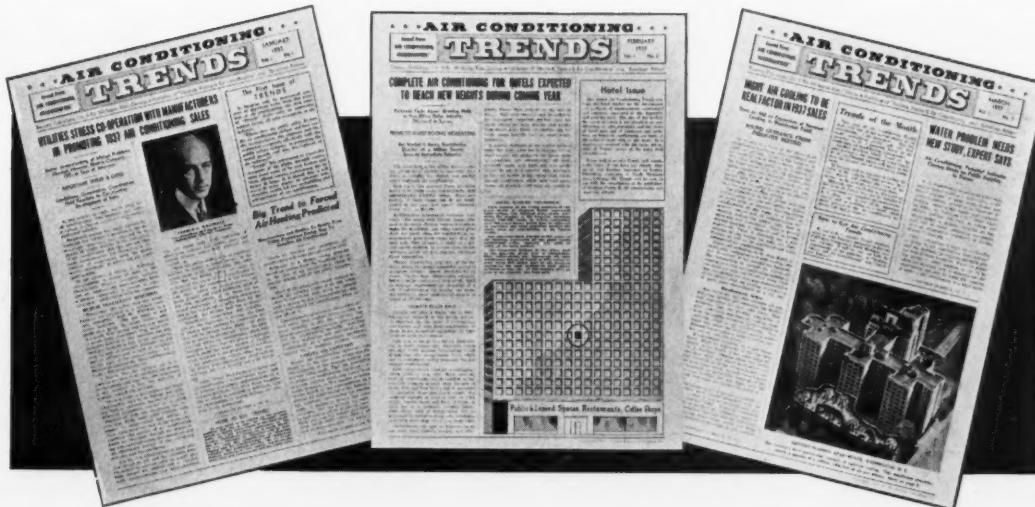
★ The popularity of Payne "A" Gas Vent is increasing. Tests and installations have proved its adaptability for venting gas appliances under almost any climatic or structural condition. Products of combustion from natural or manufactured gas have no deteriorating effect on the 99% pure aluminum inner tube of Payne "A" Vent.

For exposed or concealed installation, the efficiency of Payne "A" Vent has been definitely established. The illustrations show two difficult venting problems where Payne "A" Vent was used to replace an unsatisfactory material, absolutely eliminating difficulties with condensate.

The high quality of materials used in its manufacture, the complete insulation, its strength, non-breakable construction and ease of installation have made Payne "A" Gas Vent the most desirable gas vent on the market. Its without an equal in the field.

Ask for descriptive circular

**PAYNE FURNACE &  
SUPPLY COMPANY  
BEVERLY HILLS, CALIFORNIA**



## MORE COMMENTS ON NEW SALES BULLETIN

• "I have just received my copy of **Trends** and would like to add my congratulations to the hundreds that must be pouring in on you . . . statistical information . . . makes this interesting and valuable . . . sure to have an effect on advertising and merchandising plans of every manufacturer."

R. L. Towne, Surface Combustion Corp.,  
Toledo, O.

• "Trends seems to fill a real need for timely air conditioning information . . ."

W. R. Mason, Fuller & Smith & Ross, Inc.,  
Cleveland, O.

• "We believe this publication will be extremely valuable to utilities, manufacturers, and contractors alike . . ."

E. S. Hildreth, Indianapolis Power &  
Light Co., Indianapolis, Ind.

• "**Trends** is very interesting and should be an aid in fostering air conditioning . . ."

R. W. Woodcock, Consumers Power Co.,  
Saginaw, Mich.

• "I have just finished reading Vol. 1, No. 1, of **Trends**, and I certainly want to be on your mailing list. You are performing a real service."

F. H. Geer, Standard Furnace & Supply Co.,  
Omaha, Neb.

• ". . . After careful analysis of **Trends** I cannot see but that it will be a wonderful help to the industry . . ."

L. W. Preece, The Winter Co.,  
Erie, Pa.

• ". . . believe that you are doing the air conditioning industry a favor by the publication of **Trends** . . ."

W. J. Busser, Jr., Busser Supply Co.,  
Lewisburg, Pa.

• "I have received **Trends** and feel . . . this is something the industry has been looking forward to . . ."

Allen J. Weinhardt, F. R. Dengel Co.,  
Milwaukee, Wis.

• ". . . We feel that this is a publication which has been needed very badly . . ."

B. E. Lowe, Southwestern Light & Power Co.,  
Chickasha, Okla.

• ". . . We find this to be of great interest and help, and it has proven quite profitable . . ."

J. S. Sligar, Trimble & Lutz Supply Co.,  
Wheeling, W. Va.

• ". . . I have enjoyed reading this issue and feel that others in the industry have also enjoyed it . . ."

W. L. Lynch, Rome-Turney Radiator Co.,  
Rome, N. Y.

• ". . . This news bulletin will find a very definite acceptance by the trade, because it serves a very important market which is just beginning to grow."

G. J. Podlesak, Fairbanks, Morse & Co.,  
Chicago, Ill.

• ". . . It is felt that this pamphlet gives a very comprehensive forecast of current and future sales possibilities in the air conditioning field."

R. V. Wiley, Hoosick Engrg. Co.,  
Hoosick Falls, N. Y.

• "I enjoyed the January number of **Trends** and would appreciate receiving it regularly."

R. M. Miller, Airtemp, Inc.,  
Dayton, O.

• "**Trends** is a fine, smart idea, and I sure want to be on the list."

A. J. Davies, George F. Climo, Jr.,  
Advertising, Erie, Pa.

• "Referring to **Trends**, it is our opinion that this is an 18-karat idea."

John G. Schroer, Cincinnati Stamping Co.,  
Cincinnati, O.

## THE PURPOSE OF "TRENDS"

"Air Conditioning Trends" is devoted wholly to the **sales** side of air conditioning. Its purpose is to provide sales, advertising, and administrative executives in the industry with reliable and up-to-the-minute information on those trends which bear either

favorably or unfavorably on the sale of air conditioning equipment, and further, to present authoritative data on the advantages of air conditioning which can be used by sellers in the more rapid development of the various air conditioning markets.

## HOW TO GET "TRENDS"

"Air Conditioning Trends" may be had regularly for the asking by anyone interested in the business side of the air conditioning field. It is issued with the compliments of HEATING, PIPING AND AIR CONDITIONING and AMERICAN ARTISAN, the publications serving the air conditioning industry's two major markets (the commercial-industrial and the residential). If you would like to get "Trends" every month, simply write on your business letterhead to the address below.

**KEENEY PUBLISHING COMPANY, 6 N. MICHIGAN AVE., CHICAGO**  
"AIR CONDITIONING HEADQUARTERS"

AT



*Long Last*

The

# DA-NITE ACRATHERM



THE advent of the Acratherm with its modern design and "heat acceleration" set a new standard in room thermostats. Hundreds of thousands are now in use . . . its acceptance has been unparalleled. Then came The Time-O-Stat, a companion instrument. Time-O-Stat gave economy of operation through lowered night temperature, with control automatically returned to the daytime temperature level — but a separate instrument, in addition to the Acratherm, was required. Now, at long last, Minneapolis-Honeywell is proud to present The Da-Nite Acratherm, which combines all the features of the Acratherm and the Time-

O-Stat in one handsome instrument. Its size is only slightly larger than the Acratherm . . . its design almost identical. Again Minneapolis-Honeywell leads the way with The Da-Nite Acratherm . . . the only control that offers, in one instrument, manually lowered temperature, night or day, with its resultant fuel economy . . . automatic return to the desired temperature level whenever wanted . . . and the accuracy of control provided only by Minneapolis-Honeywell "heat acceleration." See the new Da-Nite Acratherm. Its moderate price will amaze you.

Minneapolis-Honeywell Regulator Co.,  
2726 Fourth Ave. So., Minneapolis, Minn.



# MINNEAPOLIS-HONEYWELL

*Control Systems*

BROWN INDUSTRIAL INSTRUMENTS NATIONAL PNEUMATIC CONTROLS



# Profits Today —and a sound future



## THAT'S THE DELCO-FRIGIDAIRE FRANCHISE

*... a complete line of heating and cooling equipment backed by the powerful name of General Motors—and a far-seeing dealer plan that offers unusual opportunities to a certain number of alert business men*

YOU'RE naturally interested in *present profits* . . . And you'll find them abundantly in the Delco-Frigidaire line of heating and cooling equipment. It includes automatic heating of all kinds and for all size houses, led by the sensational Delco Oil Burner—fastest selling oil burner in the world. And it includes cooling and air conditioning equipment for homes and businesses of all kinds—featuring the successful *Controlled-Cost Air Conditioning*.

But to you, as a sound business man, the *future* is of even greater importance.

And here the Delco-Frigidaire Franchise means *most*—for it offers you a chance to build a *lastingly* successful business.

Read the five major points of the Delco-Frigidaire Franchise shown on this page.

Then if you are interested, mail the coupon below.

—*It pays to have this Franchise*—  
**DELCO-FRIGIDAIRE**

*The Air Conditioning Division of General Motors*

**AUTOMATIC HEATING, COOLING AND CONDITIONING OF AIR**

*Compare any other  
Franchise with these*

### 5 DELCO-FRIGIDAIRE ADVANTAGES

- 1 The power of the name *General Motors* . . . and the proven record of General Motors in taking its dealers to the top.
- 2 A complete line of heating and cooling equipment . . . offering such *proven* sales arguments as the Thin-Mix Fuel Control and *Controlled-Cost Air Conditioning*.
- 3 The right products at prices so competitive that *no sale need be lost*.
- 4 Accepted national leadership and widespread public acceptance.
- 5 Dominant and convincing advertising and sales promotion that tells a competitive story—both nationally and locally.

*Write for more information  
about this great Franchise*

### MAIL THIS COUPON TODAY

Delco-Frigidaire Conditioning Division  
General Motors Sales Corporation  
Dayton, Ohio—Dept. AA-4

I am interested in your Franchise. Please send me complete information at once.

Name \_\_\_\_\_

Address \_\_\_\_\_

City and State \_\_\_\_\_

**HERE'S Ideal AIR CONDITIONING**  
**Plus YEAR-ROUND HOT WATER SUPPLY**  
*without a STORAGE TANK*



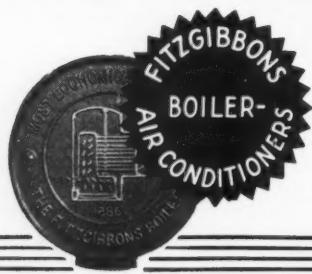
**M**AKE new homes more attractive to buyers—present homes more livable. Provide the homes with healthful air conditioning—plus YEAR-'ROUND HOT WATER SUPPLY, without a storage tank.

The FITZGIBBONS BOILER - AIRCONDITIONER *cleans, tempers and humidifies* the air and constantly circulates it through the rooms. At the same time, this unit supplies abundant *clean hot water* — summer and winter — at remarkably low cost. *No storage tank or other outside accessory is required.*

**Get complete information**  
 about this *modern* residential unit. Write NOW!

The boiler is made in styles for any type of automatic heating — oil burner, gas burner or stoker. The entire unit, including burner, is concealed beneath a compact, streamlined, beautifully enameled jacket that harmonizes perfectly with any basement recreation room. Gives broadest scope to basement planning.

**The FITZGIBBONS  
BOILER-AIRCONDITIONER**



**Fitzgibbons Boiler Company, Inc.**

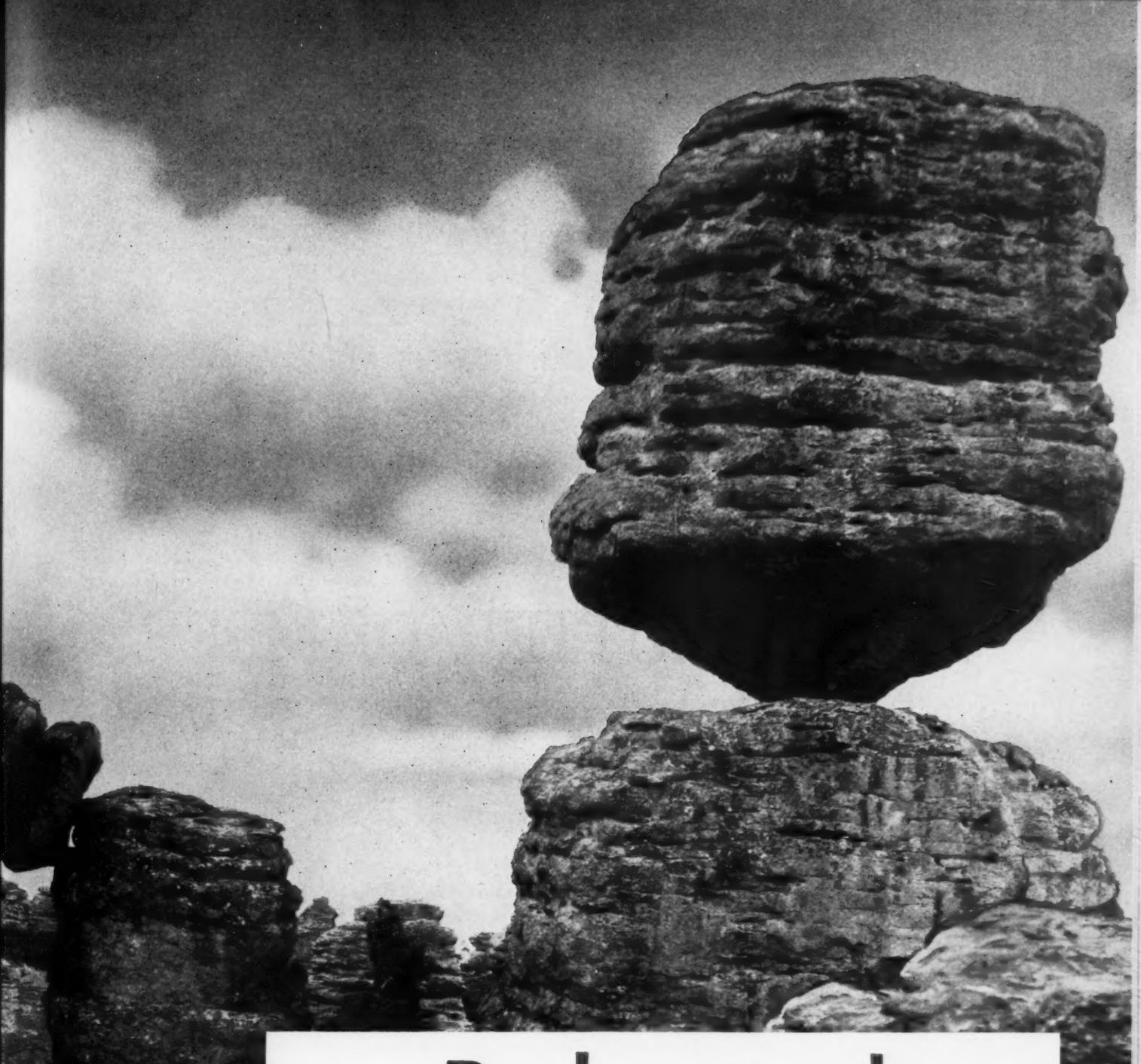
*General Offices*

ARCHITECTS BLDG., 101 PARK AVE., NEW YORK, N. Y.

*Works: OSWEGO, N. Y.*

*Branches and Representatives in Principal Cities*

**DISTRIBUTED IN CANADA BY**  
 Fess Oil Burners of Canada, Ltd., Toronto and Montreal



# Balanced

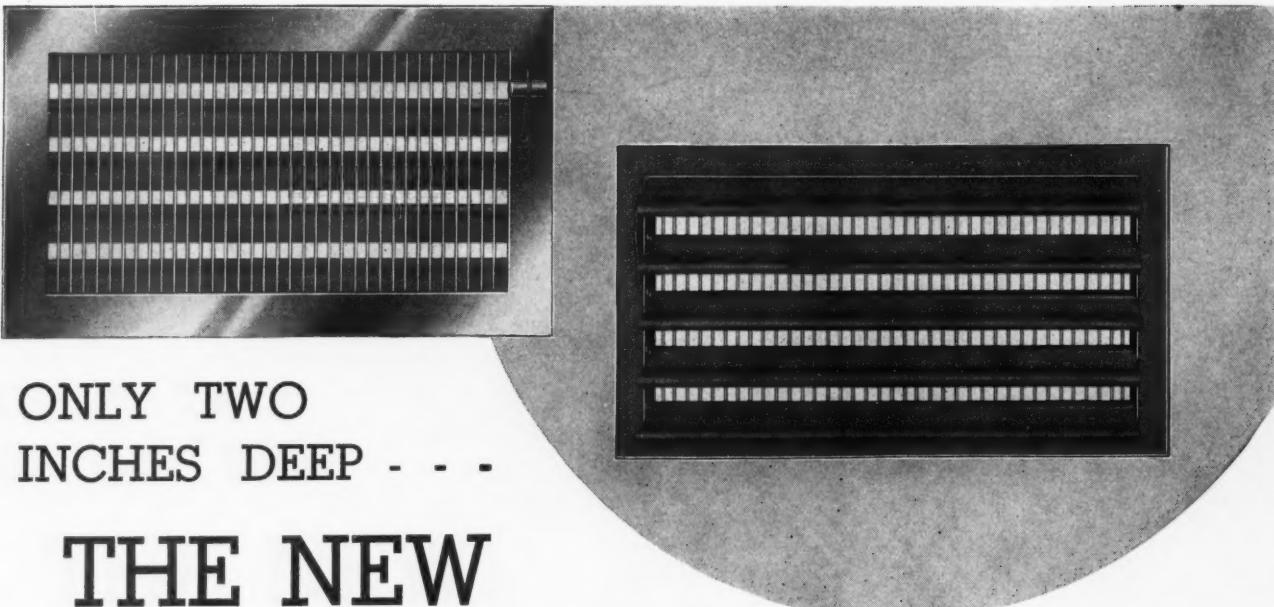
*The famous Balanced Rock in the "Wonderland of Rocks,"  
Arizona—28 feet high; estimated weight, 50 tons.*

Delco motors are both statically and dynamically balanced—all rotating parts being carefully checked for balance at all running speeds. The result is smooth, vibrationless and quiet operation throughout many years of use... another factor in the preference shown for Delco motors by makers of the better refrigerators, washers, ironers, stokers, oil burners and air conditioners. **DELCO PRODUCTS DIVISION, General Motors Corporation, Dayton, Ohio.** . . . In Canada: McKinnon Industries, Ltd., St. Catharines, Ont.

**DELCO MOTORS**



April, 1937

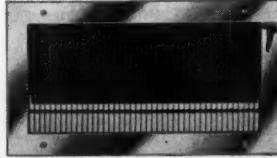


## THE NEW MULTI-SHUTTER DAMPER

Tuttle & Bailey Engineers present a new Multi-Shutter Damper which can be furnished on any T.-B. Air Conditioning Register in place of the single valve damper. This Multi-Shutter Damper, integral with the register face, is only two inches in depth irrespective of the size of the register and can therefore be used in many places where there is no room for a single valve damper to swing. The friction provided for the shutters is tense enough so that the louvres remain in any given position once they have been set.

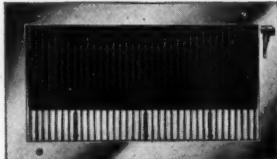
### AIRLINE REGISTER

Outstandingly in a class by itself! Modern, Economical, fixed deflection, Vertical or horizontal bar settings, close mesh, strong.



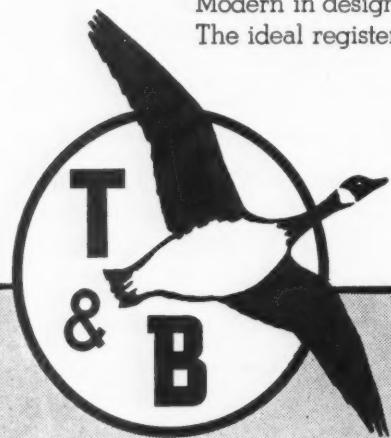
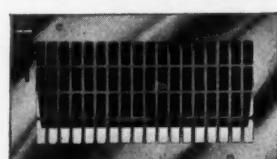
### FLEXAIR REGISTER

Air deflection on the job. Modern, Strong, Easy to Clean. Vertical or horizontal bar settings. Deflection operator locks bars securely at any desired angle.



### ECONOMAIR REGISTER

Modern in design. Very inexpensive. Efficient. Attractive. The ideal register for speculative building.



"THE STANDARD OF COMPARISON"

**TUTTLE & BAILEY INC.**

NEW BRITAIN, CONN.

BOSTON NEW YORK PHILADELPHIA CHICAGO

Trade Mark

# NORGE

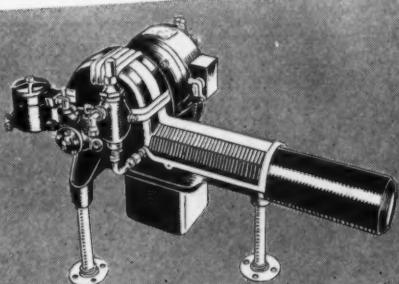
## HEATING AND AIR CONDITIONING EQUIPMENT

# LEADS

IN *Economy FOR HOME OWNERS*  
AND *Profits FOR DEALERS*

**WHIRLATOR OIL BURNER...**

The Norge Whirlator Oil Burner operates on the exclusive *Whirlator* principle—clean, quiet, economical. For use in the Norge Fine-Air Conditioning Furnace or in modernizing existing home heating plants.

**THE NORGE GAS BURNER...**

Cuts gas heating costs as much as 50%. Triple-control gives economy never before possible with gas. Be sure to get full details about this amazing burner.

- Every home owner wants to cut heating costs. Every dealer wants to make more money in his business. Norge engineers have designed a line of heating and air conditioning equipment that answers the desires of both home owners and dealers.

You can prove Norge economy of operation to your prospects. And we can prove the profit possibilities to you—profits that are not diminished by frequent service calls. Get the Norge story from your nearest distributor today, or write or wire:

**NORGE HEATING AND CONDITIONING DIVISION**  
*Borg-Warner Corporation, Detroit, Michigan*

**NORGE FINE-AIR CONDITIONING FURNACE...**

Filters, warms, humidifies and circulates air in every room of the house. Can be adapted easily to full summer air conditioning as well. Delivers as much as twice the usual amount of heat that old-fashioned furnaces or boilers do from every unit of fuel!

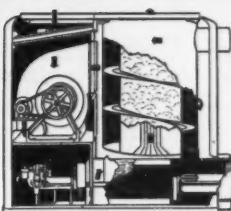
**NORGE**

*Plus Value Home Appliances*



See the sensational New Rollator Refrigerators, Concentrator Ranges, Autobuilt Washers and Duotrol Ironers—the 1937 performance and style leaders.

HC-5

**HEATING COSTS CUT AS MUCH AS 50%**

Exclusive design of heat transfer unit makes possible a saving of up to 50% in heating costs for the average home now using old-fashioned equipment.

- **INVESTIGATE** the Norge franchise NOW! Get in on the hottest heating line in the field—backed by a powerful Norge sales promotion and advertising program. Liberal finance plans make it easy to be a Norge dealer.

April, 1937

**MR. FLAGG of BANGOR**

**Says:**

In highly recommend it we find a ready sale d-Aire Units and also we are sure of our profit

Mr. Flagg, President of The R. M. Flagg Co., Bangor, Maine, has written a letter to Gar Wood Industries, Inc., Detroit, Michigan, expressing his satisfaction with Gar Wood equipment. The letter is dated March 11, 1937.

**WITH the FAMOUS**

**Gar Wood**

**HEATING and AIR CONDITIONING UNITS**

March 11, 1937

Car Wood Industries, Inc.  
7924 Hiawatha Street  
Detroit, Mich.

Gentlemen:

In the winter of 1931-32 I took on the Gar Wood dealership, after searching the market for equipment that was reliable, economical and the least likely an after installation burden. Results have proven the wisdom of their selection. Each year the results have grown better. Sales have come easier, and now that we have a great many installations in this territory, it is still easier to sell because the results obtained, so far as service and economy are concerned, are unbelievable.

At the time I took on Gar Wood, I had the distribution of four different oil burner outfitting. Today, we are 100% Gar Wood so far as oil burning equipment is concerned, and we are progressing in it. Increased our sales of this equipment last year over 1935 approximately 92%. We find a ready sale for Gar Wood burner because of the fact that we are sure of our profit.

Burner-Suregar units have been installed in many homes sold. We are sure of our profit because of the fact that Gar Wood equipment is more reliable than other equipment.

In the past the service has been practically nil. Have made a specialty of this type of equipment, owing to the heating trend since 1932.

I wish to say that my first installation of an oil burner dates back to 1917. Have handled a great many makes. I am now 100% Gar Wood and expect to increase my business 300% in 1937.

Yours very truly,

THE R. M. FLAGG COMPANY  
James W. Flagg  
President

RIT/LA

GAR WOOD BOILER BURNER UNITS  
HOT AIR FURNACES  
HOT WATER BURNERS  
FUEL OILS

• What Mr. Flagg enjoys in Bangor can be enjoyed in your town, too! For the air conditioning trend is decidedly toward Gar Wood. It is what builders, architects, owners want. Because it is 100 per cent direct-fired winter air conditioning it heats, humidifies, circulates and filters the air

in every room of the house. It blower-cools in summer. To sell and install the Gar Wood takes very little more shop equipment than you need for ordinary oil burner installation and service. There is no "engineering" to do. It has all been done for you. The Gar Wood book of "Engineering Standards" gives you complete tables, all so simple that you only need to add and multiply to get the good results that Gar Wood dealers all over the country are getting. You can depend on the results, too! Years of laboratory testing and thousands of actual installations have taken the guesswork out of Gar Wood air conditioning. Write now for the Gar Wood Franchise details!

**Gar Wood**  
**AIRDUX**  
REG U.S. PAT. OFF.

Standardized duct parts that simplify your work and assure perfect results. They are the result of years of research in field and laboratory. You erect them on the job with a few simple tools. No templates to make. They hold your costs and delays to a minimum.

Air Conditioning Division  
**GAR WOOD INDUSTRIES, INC., DETROIT, MICHIGAN**

THE **Gar Wood**  
LINE IS COMPLETE

TEMPERED-AIRE  
Gas and Oil Fired Complete Winter Air Conditioning System.

SPLIT-SYSTEMS  
for Radiant Heat and Air Conditioning

BOILER-BURNER UNITS  
for Hot Water or Steam Radiation

COMMERCIAL HOT WATER HEATERS  
for Buildings and Apartments

AIR CIRCULATORS  
for Homes, Stores and Offices

HOUSEHOLD WATER HEATERS  
both Storage and Coil Types

CONVERSION OIL BURNERS  
for all types of home heating plants

**GAR WOOD AIRDUX**  
Pre-built, simplified duct system





Wherever you need a motor that must be unusually quiet—for such home-comfort installations as Fans, Blowers, Humidifiers and similar Air Conditioning Equipment—use Century Capacitor Motors.

They do not contribute disturbing noises to the installation.

Resilient mountings isolate all mechanical and magnetic vibration and prevent their being transmitted to the driven equipment.

CENTURY ELECTRIC COMPANY

1806 Pine Street

Offices and Stock Points in Principal Cities

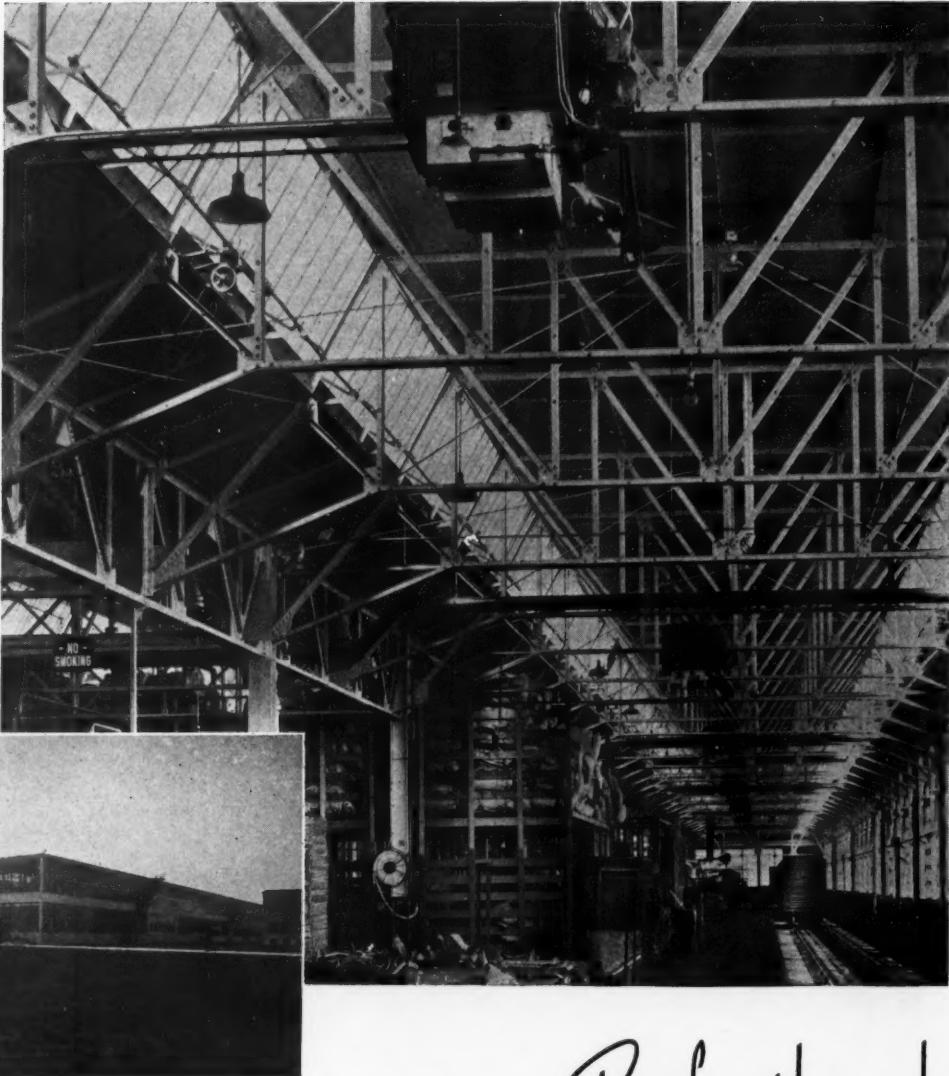
St. Louis, Missouri

SIZES UP TO 600



HORSE POWER

April, 1937



East bay of the General Motors assembly building showing Pacific Overhead Heating Units.

**GENERAL MOTORS NEWEST PLANT IS**

*Pacific Heated*

The new General Motors Assembly Plant in South Gate is "Pacific-Heated" throughout. One hundred forty-three giant overhead units of 200,000 BTU capacity, totalling 28,600,000 BTU input per hour, maintain a comfortable working and operating temperature.

In the main assembly building, fan driven overhead units are used with adjustable louvers to direct the warm air downward. In paint rooms the units are housed in separate compartments with ducts leading to various outlet points.

We are mighty proud of the fact that General Motors selected Pacific-Heating over all other proposals submitted. We are also proud that under the stress of Southern California's coldest winter in 30 years, the system proved equal to the excessive heating demands.

To insure customer satisfaction bring your heating problems to Pacific, the largest manufacturer of gas-heating appliances in the West. Write for Catalog AA4.

**PACIFIC GAS RADIATOR COMPANY**

HUNTINGTON PARK, CALIFORNIA, U. S. A.

Be sure and see our exhibit at the A. G. A. E. M. Convention at Kansas City, May 10, 11, 12, 13 and 14.



## Only SUPERFEX could do it!

**PROVED**—These new homes in Philadelphia prove anew that the great demand for air conditioning in the popular-priced home market has now been met. These Philadelphia-type row houses, scores of them selling at \$4190, have air conditioning in all six rooms with SUPERFEX Oil Burning Air Conditioning Heating Plants, model 100-E.

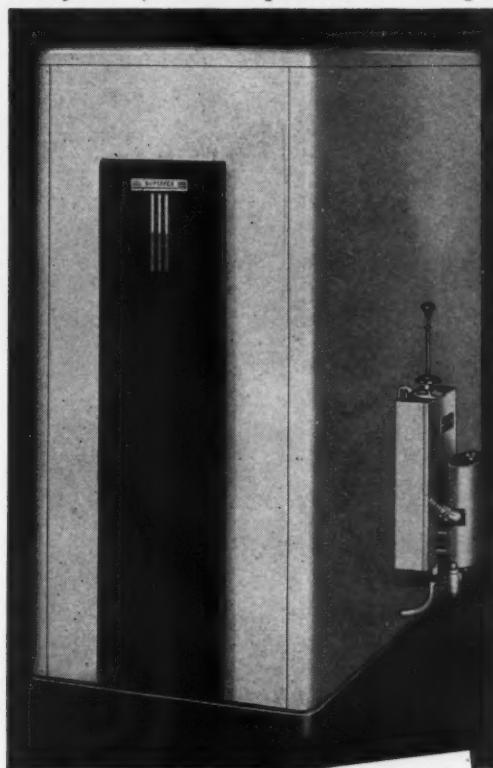
**SUPERFEX** model 100-E is shipped assembled and can be moved through a standard door, making for ease of installation. Btu output, 65,000 at the registers. Constant humidification, air filtration and heat circulation. During the building period, **SUPERFEX** can be operated manually to quicken the dry-out period.

**SUPERFEX** alone gives continuous 24-hour air conditioning. No makeshift air conditioning this!

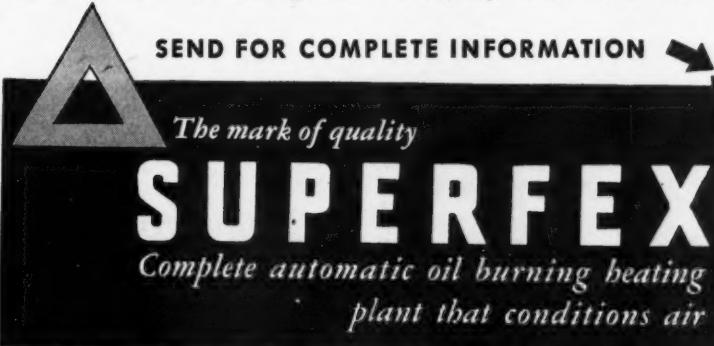
Mark this outstanding feature: The exclusive synchronized "High-low" burner and "High-low" blower gives air conditioning throughout every hour of the day and night. And not in a few rooms but in every room! Gone is the dead period of the intermittent burner when air circulation ceased. With **SUPERFEX**, mildly warmed humidified and filtered air is in gentle circulation between the thermostatic calls for more robust heat. Here, at last, is true winter air conditioning!

**NEWS for Architect—Builder—Home Owner—Dealer.** At last the demand for low cost continuous air conditioning is met. Learn all about this most interesting advance in air conditioning. Mail the coupon today. Colorful booklets completely describing this unique product of Perfection Stove Company will be sent immediately.

**SUPERFEX** No. 100-E Btu output 65,000 at the register.  
One of three models with up to 140,000 Btu output.



SEND FOR COMPLETE INFORMATION



The mark of quality

PERFECTION STOVE COMPANY, 7858-B Platt Ave., Cleveland, O.  
Please send complete information about the new **SUPERFEX** Oil Burning Air Conditioning Heating Plant.

Please check:  Architect    Builder    Dealer    Planning new home

Name \_\_\_\_\_

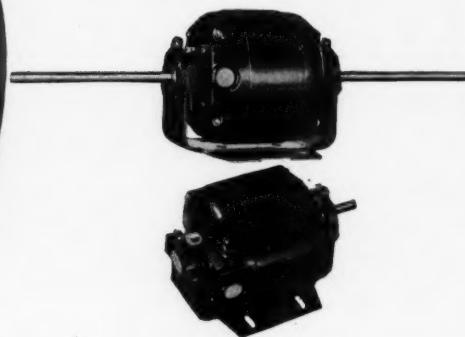
Street \_\_\_\_\_

Post Office \_\_\_\_\_ State \_\_\_\_\_

# PART OF YOUR NEXT SALE IS ALREADY MADE



**WITH G-E  
MOTORS ON YOUR  
EQUIPMENT**



G-E MOTORS  
PASS ALL TESTS

## HIGH-QUALITY FEATURES

### Cast-aluminum Rotor—

Cannot burn out or become open-circuited—no soldered or welded joints.

### Reliable Starting Switch—

Positive-acting, quiet—tested by more than a million operations.

### Rubber Mounting—

Rings of rubber isolate motor vibrations—operation of the motor is almost inaudible.

**W**HEN prospects know that the air-conditioning and warm-air heating equipment that you supply is provided with G-E motors, they have confidence that the electric equipment is dependable, for they know General Electric's high standards of quality. Your reputation as a reliable heating contractor, plus this confidence in G-E motors, makes the complete unit easier to sell and shortens the time required to close a sale.

Thus you have more time to convince prospects of the advantages of automatic heating, to demonstrate the benefits and comforts of domestic air-conditioning. With this additional time you can prepare the way for increased sales by going out to contact prospects instead of waiting for them to come to you. General Electric, Dept. 6A-201, Schenectady, N. Y.

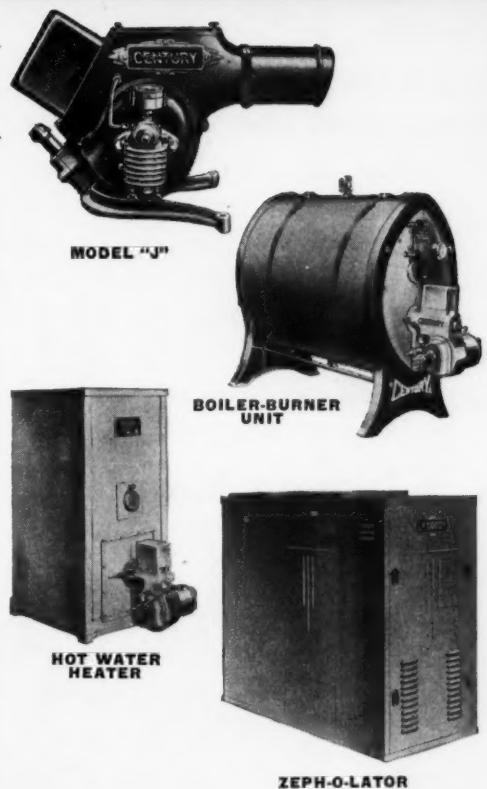
LET G-E MOTORS HELP YOU SELL

**GENERAL ELECTRIC**



070-166

# DON'T CRIPPLE YOUR SALES with an INCOMPLETE line!



Century's complete line of smartly styled models opens a vast new field for automatic oil heat. It's a market you don't want to miss.

For the hundreds of new homes under-way in your community, you can easily sell one of Century's complete heating units. The Century Zeph-O-Lator, for warm air conditioned heating, or the Century Boiler-Burner Unit for steam, vapor, or hot water systems.

Each of these striking units offers all the outstanding advantages of Century burners, including Floating Flame, Even-Flo Combustion, the new type Century Fuel Unit assembly and many others . . . plus special designs which produce maximum overall heating efficiency. All at remarkably low prices.

Hundreds of dealers, too, enthusiastically acclaim the Century Hot Water Heater with its extra big capacity of 200 gallons an hour from only a few cents worth of cheap fuel oil. And of course, the Century Model J continues to be one of America's fastest selling conversion burners.

For these four Century products, there are four distinct markets. If you are not selling them all, you're crippling your sales and your profits, too. So write today for specifications and details of the complete Century line. You still can get in on Century's nationwide advertising campaign to give American Women Furnace Freedom. The CENTURY ENGINEERING CORP., Cedar Rapids, Iowa.

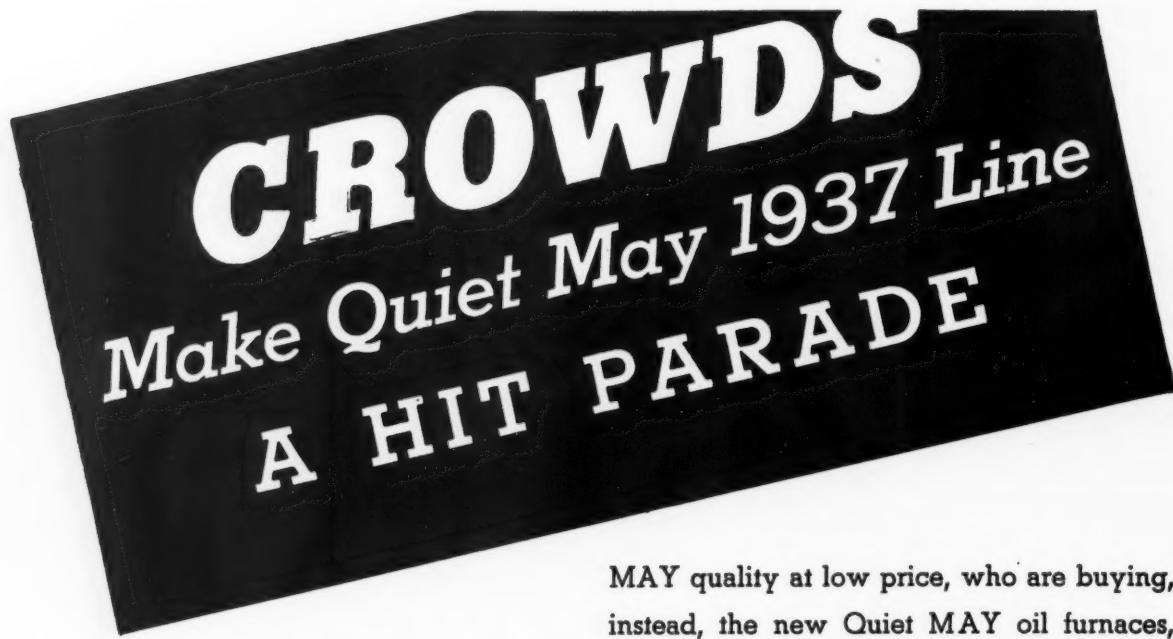
***Flash!***

Century sales are skyrocketing as dealers everywhere are changing to this fast selling line.

Write for full details of the money-making Century franchise in your community. Hurry! It may not be available tomorrow.

# CENTURY

Conversion Burners . . . Boiler-Burner Units . . . Warm Air Furnace Units with Air Conditioning . . . Hot Water Heaters



QUIET MAY dealers are selling every unit in the great new 1937 line at a clip that makes quotas look petty.

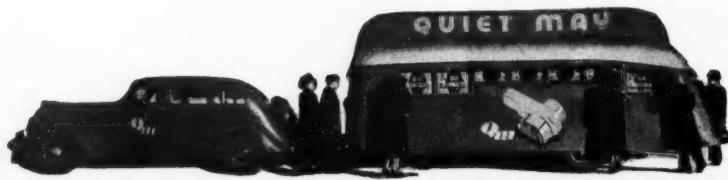
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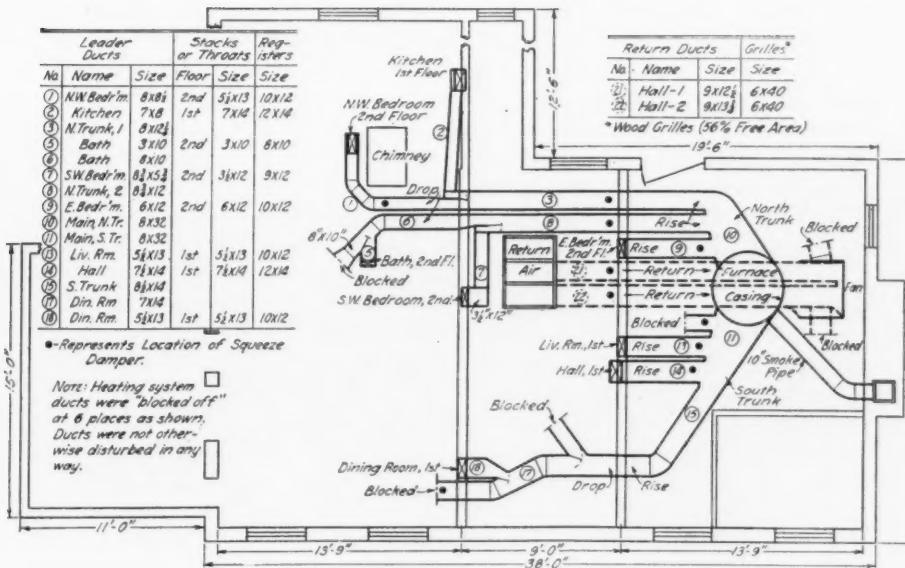


Fig. 2. Basement plan showing duct layout for forced-air system in use for distributing cool air.

## A Resume of Summer Cooling in the Research Residence\*

By M. K. Fahnestock

Research Assistant Professor of Mechanical Engineering  
University of Illinois

THE purpose of this paper is to give a brief résumé of the research work in summer cooling or summer air conditioning which has been done at the University of Illinois. The work starting in 1932 has been limited entirely to residential cooling studies carried on in the Research Residence,<sup>†</sup> using ice, mechanical refrigeration, water from the city mains, and outdoor air at night. The different methods of cooling, accompanied with the wide variations in weather experienced during the past four cooling seasons, have resulted in the accumulation of a large amount of data,

of which only the most significant and practical can be included in this paper. The tests have been reported in detail in research papers<sup>‡</sup> of the American Society of Heating and Ventilating Engineers and will ultimately comprise bulletins<sup>§</sup> of the Engineering Experiment Station. All of the data and figures appearing in this paper have been taken from these publications.

The tests were conducted by the Engineering Experiment Station of the University of Illinois in cooperation with the American Society of Heating and Ventilating Engineers and the National Warm Air Heating and Air Conditioning Association. They were made in the Department of Mechanical Engineering under the direction of Professor A. P. Kratz. Special acknowledgments are also due the several manufacturers who made financial contributions and loaned equipment for the work.

The Research Residence, familiar to all, is of a common type of frame construction. The wall section consists of bevel siding, building paper, sheathing, studing, wood, lath and plaster. The roof is of copper shingles, blackened from soot and corrosion after several years' exposure to the elements. The walls are not insulated, and no weather-stripping, double-glazing, or storm sash is used at the windows or doors. The building faces to the south, and, with the exception of a short time during the first season's cooling studies, it has been equipped with awnings on all east, south, and west windows.

\*Excerpt from a paper "Research in Summer Cooling at the University of Illinois," delivered at the Conference on Air Conditioning in Urbana, May 4 and 5, 1936.

†The Research Residence in Urbana, Illinois, was built, furnished, and completely equipped specifically for research work in Warm-air heating by the National Warm Air Heating and Air Conditioning Association in December, 1924.

‡"Study of Summer Cooling in the Research Residence at the University of Illinois," by A. P. Kratz and S. Konzo. Transactions A.S.H. and V.E., Vol. 39, 1933, pp. 95-118.

"Study of Summer Cooling in the Research Residence for the Summer of 1933," by A. P. Kratz and S. Konzo. Transactions A.S.H. and V.E., Vol. 40, 1934, pp. 167-198.

"Study of Unit Room Coolers in the Research Residence," by A. P. Kratz, M. K. Fahnestock and S. Konzo. A.S.H. and V.E. Journal Section of Heating, Piping and Air Conditioning, November, 1934, p. 483.

"Study of Summer Cooling in the Research Residence for Summer of 1934," by A. P. Kratz, M. K. Fahnestock, S. Konzo, and E. L. Broderick. A.S.H. and V.E. Journal Section of Heating, Piping and Air Conditioning, January, 1935, pp. 29-30.

"Study of Summer Cooling in the Research Residence Using Water from the City Water Mains," by A. P. Kratz, M. K. Fahnestock, S. Konzo, and E. L. Broderick. A.S.H. and V.E. Journal Section of Heating, Piping and Air Conditioning, May, 1936.

§"Investigation of Summer Cooling in the Research Residence," University of Illinois Engineering Experiment Station Bulletin. (The manuscript for this bulletin is now being prepared and it will contain the results of the investigation when cooling with ice, mechanical refrigeration, and night air.)

There are three stories in the residence, but for the cooling studies the third story was considered as an attic space, and was closed off by means of a door at the top of the stairs. Likewise, on the first story, the sun room was isolated by closing the door between it and the adjoining room. The total space cooled, in addition to six average size rooms, included a breakfast room, a bath room, and a stairway, with interconnecting halls, making in all about 14 170 cu. ft. of space, of which 7,300 cu. ft. were on the first story and 6,870 cu. ft. were on the second story. The method of calculating the design cooling load has been revised from time to time, making use of more complete and accurate data as it has become available. The major revisions have been in relation to the load due to solar radiation and the effect of various window appurtenances. The design load for the space cooled in the residence calculated by the method outlined in the A.S.H. and V.E. Guide, 1934, was 37,500 B.t.u. per hour. In accordance with the recommendations in the Guide, an outdoor design temperature of 91 deg. F. was selected, and 80 deg. F. was used as the inside temperature. On the average there were about four persons in the house, and as there was practically no cooking, there was no heat from that source.

#### The Duct Layout

The basement plan and the forced-air heating plant are shown in Fig. 2. With a few minor changes the forced-air duct system used for heating was adapted for distributing cool air for the cooling studies. All return ducts, with the exception of the central one leading from the foot of the stairs on the first story, and which contained the cooling coil, were blocked. The delivery ducts to the third story and the sun room were blocked, as indicated, and by means of dampers in the ducts leading to the first and second stories the cooling loads on these two stories were balanced. The air velocities in the ducts did not exceed 750 ft. per min., and in most cases they were considerably below that value. The cool air was introduced into the various rooms through a common type of baseboard register, except in one case where a wall type of register located 7 ft. above the floor was used.

#### The Central Cooling Plants

Three different cooling plants, using ice, mechanical refrigeration, and water from the city mains, have been installed and operated in the Residence during the course of the cooling studies. Although the plants were assemblies of pieces of commercial apparatus, in most instances, additions, refinements, and operating conditions had to be modified from what would have been considered good commercial practice in order to facilitate the taking of test data. This was particularly true in the case of the plant using ice for cooling. In general, the arrangements of all of the plants were similar to that of the mechanical refrigeration plant shown in Fig. 3. With each installation an extended surface cooling coil was located in a by-pass in the one central return duct and the flow of the refrigerant or cooling medium was always counter to the flow of the air. This arrangement provided that the coldest or leaving air

came in contact with the tubes containing the coldest refrigerant. For the purpose of heating, the dampers at *B* and *C*, in Fig. 3, were adjusted and the air was delivered directly to the fan without passing through the cooling coil. The wet- and dry-bulb temperatures of the air as it entered and left the coils were taken with thermometers and thermocouples, and facilities were provided for collecting and weighing the moisture removed from the air during the cooling process. The cooled and dehumidified air after leaving the cooling coil passed directly to the fan and then to the furnace casing, whence it was distributed through ducts to the various rooms on the first and second stories of the residence.

During all tests, when cooling with ice, mechanical refrigeration, or water from the city mains, all windows on the first and second stories remained closed. The windows in the attic remained open when cooling with mechanical refrigeration and water from the city main, but they were closed when the tests using ice were made.

#### Details of the Plant Using Ice for Cooling

In addition to the air ducts, cooling coil, and fan, the plant using ice for cooling included an insulated bunker or tank having an ice capacity of 4,000 lbs. The chilled water was pumped from the bottom of the tank through the cooling coil, which was six rows deep in the direction of air flow. Spray-heads located in the top of the tank sprayed the water returning from the cooling coil

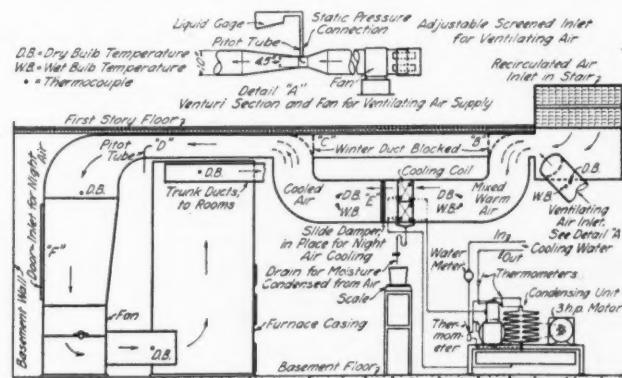


Fig. 3. Diagram of cooling plant with mechanical refrigeration.

over the ice, which was placed on racks, and both the circulating water and the meltage drained to the bottom of the tank. By means of a constant level drain the amount of ice melted during any period of time could be determined, and with minor corrections this ice meltage represented the cooling load. It was this comparatively simple and convenient method of determining the cooling load that led to the selection of ice as the cooling medium for the first cooling studies made in 1932. With this plant the winter return duct was not tightly blocked at *B* and *C* as shown in Fig. 3, but instead, a modulating by-pass damper was located at *B* and the damper *C* was omitted entirely. Whenever cooling was needed a constant quantity of cold water was circulated through the coil, and the control of the air temperature in the residence was obtained by a thermostat located in the dining room on the first story.

This thermostat operated by the by-pass damper causing larger or smaller quantities of return air to pass through the cooling coil, depending upon the load requirements. The fan used for heating was also used for cooling, and under the conditions of operation it delivered 1,475 cu. ft. of air per min. which was equivalent to 6.2 air recirculations per hour. No provision was made for bringing air in from the outside for ventilating purposes, or for cooling with outside air at night. For the majority of the tests the house was equipped with awnings on all east, south, and west windows, but for the purpose of determining the effect of awnings in decreasing the cooling load a few tests were made with the awnings removed.

#### Plant Using Mechanical Refrigeration

As previously stated, Fig. 3 shows the arrangement of the cooling plant with mechanical refrigeration. The condensing unit consisted of a double-pipe condenser and a four-cylinder Freon compressor with a rating of 30,000 B.t.u. per hour. The compressor was driven with a 3 hp. motor. Cooling and dehumidification were accomplished by the direct expansion of Freon refrigerant in an extended surface coil or evaporator placed in the by-pass in the one central return duct. This coil was 4 rows deep in the direction of air flow.

In the common refrigeration cycle the warm air, in passing through the cooling coil or evaporator, gives up heat to the refrigerant within the coil, causing it to boil and change from a liquid to a gaseous state. The gas, at a relatively low temperature and pressure, is returned to the compressor, compressed to a higher pressure and discharged into the condenser. During the compression process the temperature of the gas is increased to a level above that of the water in the condenser. Thus, in the condenser the hot gaseous refrigerant can give up heat to the condenser cooling water, and in doing so condenses or returns to the liquid state. It is a continuous and closed cycle in which the refrigerant absorbs heat from the air and conveys it to the condenser where it is transmitted to the condenser cooling water and discharged outside of the building.

With this plant the winter return duct was tightly blocked at *B* and *C*, as shown in Fig. 3, and all of the air delivered to the fan in the forced-air system passed through the cooling coil when the plant was operating. The amount of cooling was controlled by means of a room thermostat placed in the hall on the second story, which served to start and stop the refrigerating unit in accordance with the cooling load required to maintain constant room temperature. The fan was run continuously through both on and off periods of the refrigerating unit, and under the conditions of operation it delivered approximately 1,300 cu. ft. of air per minute. The same fan was used during the previous cooling studies when ice was the cooling medium. For the purpose of ventilation during the periods when the plant was operating, outdoor air equivalent to one air change per hour was brought in through the duct shown as Detail A in Fig. 3. Thus, of the total of 5.5 air changes per hour delivered by the fan, 4.5 air changes were recirculation of the air in the house and one was ventilating air from outdoors. The fan motor was one-third horsepower.

For the purpose of providing outdoor air for cooling during the night, a slide damper, *E*, was placed in the by-pass duct on the down-stream side of the cooling coil, and a door, *F*, was placed in the recirculating duct near the fan inlet. When cooling with outdoor air at night the basement door and the door in the recirculating duct were opened, and the slide damper was closed. Under these conditions of operation the fan delivered 2,250 cu. ft. of air per minute, which was equivalent to 9.5 air changes per hour.

#### Plant Using Water from the City Mains

In general, the arrangement of the cooling plant using water from the city supply mains was the same as that of the mechanical refrigerating plant shown in Fig. 3. The cooling coil, consisting of 8-rows of finned tubes in the direction of air flow, was placed in the by-pass in the one central return duct. The center winter return duct was tightly blocked at *B* and *C*, as shown in Fig. 3, and all of the air delivered to the fan passed through the coil when the plant was operating. The water from the city service main, available at a temperature of approximately 58 deg. F., passed through a calibrated water meter before entering the coil. The operation of the plant was controlled by the room thermostat located

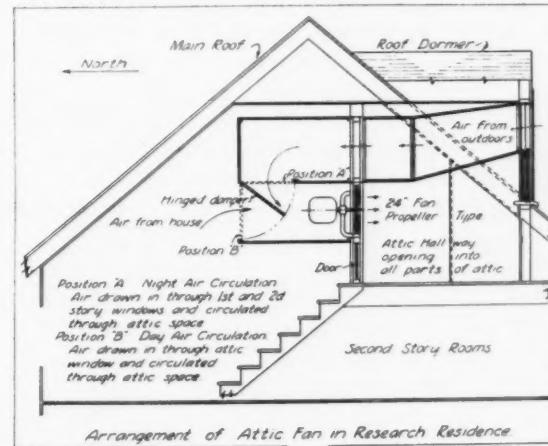


Fig. 4. Arrangement of attic fan in research residence.

in the hall on the second story, which served to start and stop the flow of water through the coil by operating a motor-driven valve placed on the outlet water line from the coil. The valve was either open or closed and the water consumption rate was 360 gal. per hour.

The cooling coil installed for economical and practical operation with water at a temperature of 58 deg. F. was necessarily deeper in the direction of air flow than the coils required during the previous cooling studies, when water chilled with ice to a temperature of 35 deg. F., and Freon operating at a suction pressure corresponding to 43 deg. F., were used. The deeper coil increased the air resistance in the circulating system, and a larger fan was required in order to maintain an air delivery of 1,300 cu. ft. of air per minute. The size of the motor driving the fan was three-fourths horsepower. A quantity of outdoor air, equivalent to one air change per hour, was brought in during the periods of plant operation for ventilating purposes. This was the same amount as used with the mechanical refrigerating plant.

(Continued on page 84)

# Pattern Development for Air Conditioning Fittings\*

This article is the third of a series which will cover practical methods for developing and cutting the patterns for fittings and typical sections used in small ventilating, residential air conditioning and forced air heating systems.

By William Neubecker

Head Instructor,  
Sheet Metal Department, New York Trade School

**W**HEN girders or other obstructions are in the path of the duct lines, various shaped offsets must be adopted. It is, therefore, important to understand the rules in designing offsets to fit given dimensions and at the same time maintain the full area throughout.

Fig. 8 shows a problem where the offset must fit in a space having similar height and width as shown by *a-b-c-d*. Set off the face width of the offset from *b* to *i* and *d* to *j*. Divide these two divisions in two equal parts as shown by *5* and *1* respectively. Draw a line from *i* to *5* and divide into four equal divisions as *1, 2, 3, 4* and *5*.

At right angles to *i* and *5* through points *2* and *4* draw lines to intersect the line *d-c* at *e* and *d-a* at *f* also *b-c* at *h* and *a-b* at *g*, respectively. Draw a line from *f* to *h*. *h* then becomes the center for striking the arcs *i-n* and *b-m* and *f* center for striking the arcs *j-m* and *d-n*. *b, i, d, j*, is the desired offset in a given space and is applicable to square or rectangular ducts with wide or narrow faces. If round or elliptical ducts are used as shown by *A* or *B* at the right, then simply draw horizontal lines from *i* and *j* to meet the miter line at *s* and *t* and connect lines from *g* to *t* and *e* to *s* shown dotted.

Then *b, g, t, j, d, e, s, i* is the outline of a three piece elbow for circular pipes, using the miter lines *t-e* or *g-s* in laying out the patterns by the usual parallel line method. If the dimensions *a-b-c-d* are of a large size, the line *f-h* cuts the offset in two parts; one being similar to the other, and a drive cleat can be used in joining the two elbows along *m-n*. If the duct used is round or elliptical or has circular ends then the line *f-h* divides the offset into 2 two-piece elbows joining at *m-n*, to fit in any given space where width and height are similar.

## Offset Elbow Having Unequal Dimensions

Fig. 9 shows an offset elbow designed for unequal dimensions or to fit into a rectangular space. By referring to Figs. 8 and 9 note that the reference letters

and figures are similar in both drawings so that the text given in connection with Fig. 8 will also apply to Fig. 9.

## Finding Degree of Elbows Plus Duct Connections in Given Dimensions

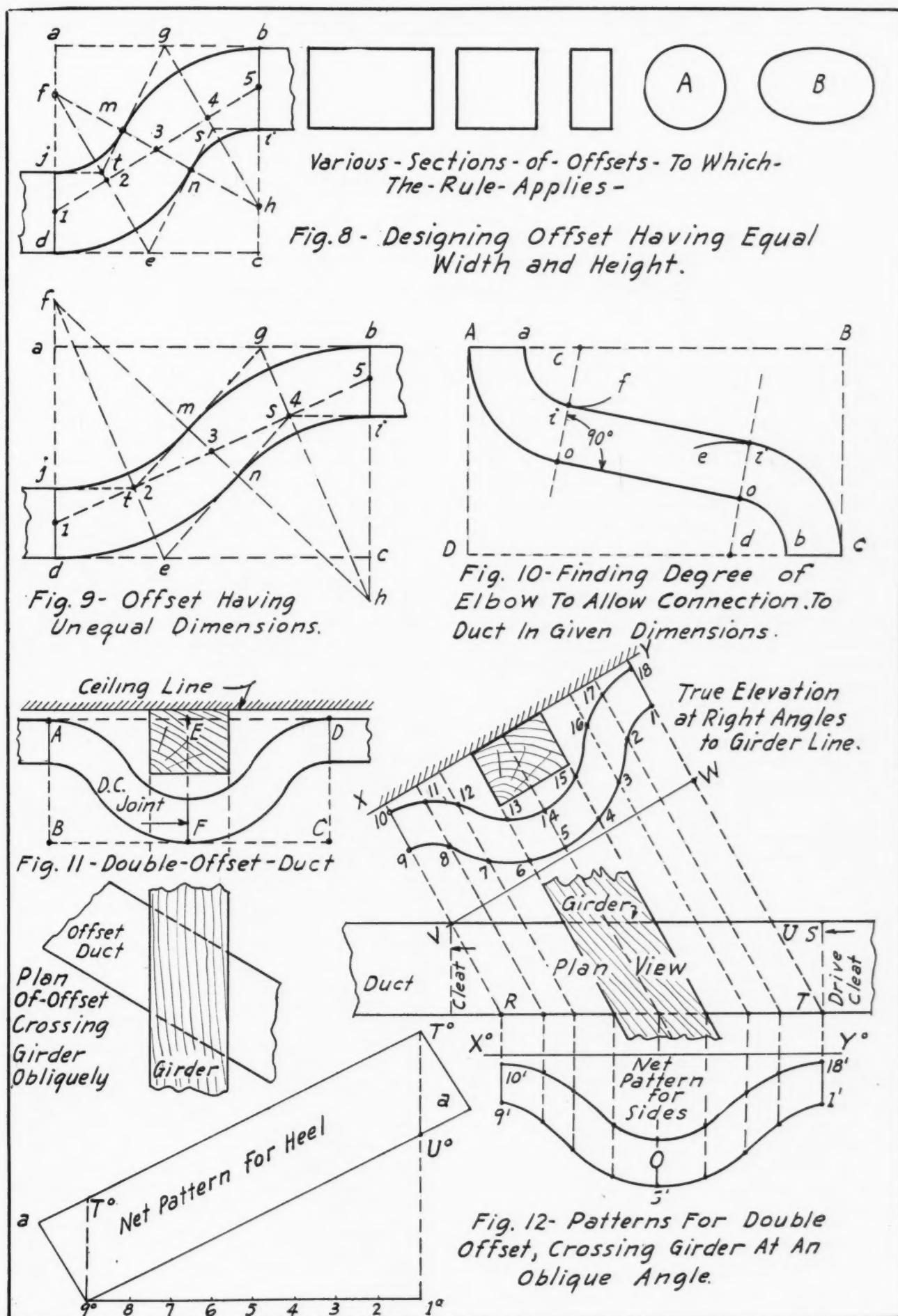
When an offset must be designed in given large dimensions, which requires a straight duct connection in the center and the proper degree elbows, the layout is accomplished by the rule shown in Fig. 10. Let *A-B-C-D* be the given dimensions. Establish the desired face widths of the offset as *A-a* and *C-b*. Assume that the radius of the throat will equal the face widths as shown by *c* and *d*. Now with *c* as center and *c-a* as radius describe the throat *a-f*. With *d* as center and *d-C* as radius describe the heel *C-e*. Tangent to the arcs *a-f* and *e-C* draw the line *i-i*. At right angles to *i-i* from the centers *c* and *d* draw the radial lines *c-o* and *d-i* indefinitely. Using *c* as center complete the heel curve *A* to *o* at top and using *d* as center complete the throat curve *b* to *o* at the bottom. This gives the proper degree for the two elbows which are similar; also the true strength of the straight length of duct whose ends are right angles, thus making the offset in three sections.

## Designing Double Offset

When a double offset is required as shown in Fig. 11 where it passes under a girder or other obstruction, it is laid out as follows: Assume that *A-B-C-D* are the given dimensions. Divide *A-B* into two parts and obtain the center line *E-F*. If *E-D-C-F* is a true square, then use the rule given in connection with Fig. 8. If *E-D-C-F* in Fig. 11 is a rectangle then use rule given in Fig. 9. Now join the design thus obtained opposite the line *E-F* as shown in Fig. 11 with a drive cleat joint along *F*. This design *A-F-D* is applicable when the duct runs at right angles to the girder line.

When the duct crosses the girder line obliquely as shown in the plan below, then a true face on the oblique line must be developed as explained in the following problem.

(Text continued on page 72)



# Factors Affecting Fuel Saving\*

By S. Konzo

Special Research Associate

Engineering Experiment Station

University of Illinois

## Reduction of House Temperatures at Night

**T**HE reduction of the house temperatures during the night period by means of manual or automatic adjustment of the setting of the room thermostat, tends to reduce the temperature difference maintained between indoors and outdoors and hence tends to reduce the fuel consumption required for a given outdoor weather condition. In the lower part of Fig. 7 is shown a line diagram which represents the temperature conditions maintained in the house with reduced setting of the room thermostat at night. The difference in heat loss from the structure when the house temperature is reduced at night as compared with the heat loss from the structure when the house is maintained at a constant temperature during the entire 24-hour period is represented diagrammatically in Fig. 7 by the area enclosed within  $ab'cd'a$ . It may be observed that the fuel savings effected by reducing the house temperatures at night will be dependent on the length of time during which the temperature is reduced, the temperature maintained during the night and the day, the rate of cooling of the house structure, the rate of rise of the

series of tests conducted in the Research Residence. In the first series of tests made with a gas-fired, gravity warm-air furnace system, a decrease in gas consumption of approximately 4 to 8 per cent was effected. In the second series of tests made with an oil-fired, forced-air heating system a decrease in oil consumption of approximately 6 to 9 per cent was effected when the thermostat setting was reduced from 71 deg. F. to 60 deg. during the period between 10 p. m. and 4:30 a. m.

In case the house temperatures are not brought up rapidly in the morning, the reduction of temperatures at night will be accompanied by a sacrifice of comfort in the house during the morning hours, brought about by the influence of cold walls and floors persisting over most of this period. The heating plant must be capable of assuming the extra load during the warming-up period without damage to the equipment resulting from the long period of continuous operation. The possible economy in fuel consumption effected by reducing the house temperature to 60 deg. F. at night would probably be less in the case of coal-fired plants than in those of gas, or oil-fired plants. However, other factors might make it advisable to bank the coal fire at night and maintain a reduced rate of combustion in the furnace in order to prevent all of the fuel from burning out before morning.

**Conclusion.**—The most effective means of making substantial reductions in fuel consumption consist in improvements in the house construction in the form of weatherstripping, insulation, and storm sash. The problems of heating are likewise greatly simplified when such improvements are made. (See Part 1, December, 1936).

In some cases, as in oil combustion, the fuel consumption will be less when the fuel is burned in a unit especially designed for that fuel. In all cases, those heating units that provide the greatest amount of effective heating surface will be the most efficient in transferring the heat from the flue gases to the circulating medium.

The stack losses from the chimney may be reduced to a minimum by maintaining clean heating surfaces, by providing the least amount of air sufficient for complete combustion, and by adjusting the combustion rate to a minimum value that will satisfy the heating requirements. In the case of gas-fired and oil-fired units, decreasing the house temperatures at night will effect a small decrease in fuel consumption.

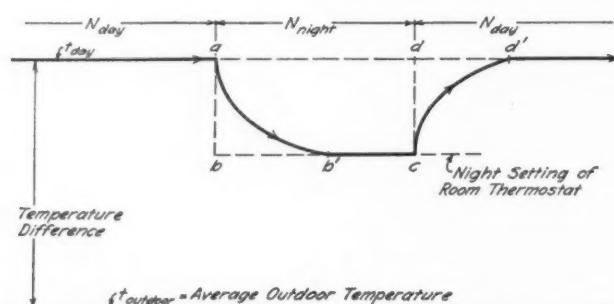


Fig. 7—Actual Changes in Indoor Temperature as Influenced by Delay or "Lag" in Cooling and Warming of Structure

house temperatures during the morning, the difference in efficiency of the combustion process during the periods of continuous and intermittent operation of the burner, and the outdoor temperature. The large number of variable factors make it very difficult to calculate accurately the probable fuel savings obtainable in any given installation.

Actual values of fuel savings were obtained from two

\*Paper presented at the First Annual Conference on Air Conditioning held at University of Illinois, May 4 and 5, 1936.

# Technical Code for The Design and Installation of Mechanical Warm Air Heating Systems [Part 2]

The first part of the new code was published in March. Lengthy tables, derived from factors in the ASHVE Guide, have been omitted. The full code, consisting of 36 pages, may be obtained from the National Warm Air Heating and Air Conditioning Association, Columbus, Ohio. Price 50 cents.

## ARTICLE 6

### Duct Design Procedure

#### SECTION 1. Outline.

- (a) Make a line diagram of tentative layout. See Figure 2.
- (b) Measure the actual length of each run from register to furnace. See Art. 6, Sec. 2, Item (b).
- (c) Compute the equivalent length of each turn in each run from register to furnace and add the same to the actual length of the respective runs. These results are the total equivalent lengths. See Art. 6, Sec. 2, Item (c).
- (d) Compute the bonnet air temperature. See Art. 6, Sec. 2, Item (d).
- (e) Compute the register temperature of each run. See Art. 6, Sec. 2, Item (e).
- (f) Compute the cfm for each register based on warm air temperature at each register. See Art. 6, Sec. 2, Item (f).
- (g) Select the run having the greatest friction loss and base the design on this resistance. See Art. 6, Sec. 2, Item (g).
- (h) Determine round pipe size for each run. See Art. 6, Sec. 2, Item (h).
- (i) Correct pipe diameter of each run for various equivalent lengths. See Art. 6, Sec. 2, Item (i).
- (j) Compute rectangular equivalents for stack and branch sizes. See Art. 6, Sec. 2, Item (j), also Tables 7 and 8.
- (k) Determine trunk sizes in round pipe diameters. See Art. 6, Sec. 2, Item (k).
- (l) Correct round pipe diameters for each trunk. See Art. 6, Sec. 2, Item (l).
- (m) For rectangular equivalents of trunk sizes, see Art. 6, Sec. 2, Item (m).
- (n) Follow same procedure for the design of the return side of the system as is used for the warm air side. See Art. 6, Sec. 2, Item (n).
- (o) Compute total resistance of the system. See Art. 6, Sec. 2, Item (o).
- (p) SELECT BLOWER to supply the total cfm at a static pressure equal to or greater than the total resistance of the system. See Art. 6, Sec. 2, Item (p). SELECT MOTOR TO SUIT BLOWER.
- (q) Select filters, washers and other appurtenances. See Art. 6, Sec. 2, Item (q).
- (r) Select registers and grilles. See Art. 6, Sec. 2, Item (r).
- (s) Select controls. See Art. 7.

## Section 2. Explanatory Notes, Section I

Item (a) A general knowledge of building construction is necessary to aid in an intelligent and practical heating layout.

If a room requires more than 150 cfm, it is best to use two or more supply openings to bring about better room circulation.

It is advisable to oversize recreation room supply to counteract radiant loss to bare basement walls and pickup load due to intermittent heating. This may be done by using a design room temperature from 5 to 10 degrees above that for living rooms.

It is advisable, when possible, to install a separate run direct from heater unit to garage, should same be heated. It is also advisable to exercise extra care in sizing supply and return lines to rooms over garages.

Return air shall be brought back from as many rooms as possible excepting from bathrooms and garages.

Figure 2

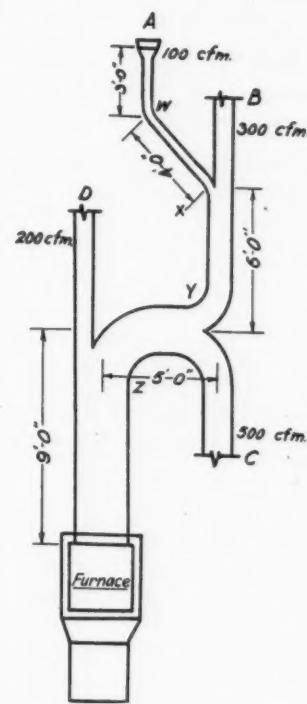


Diagram A

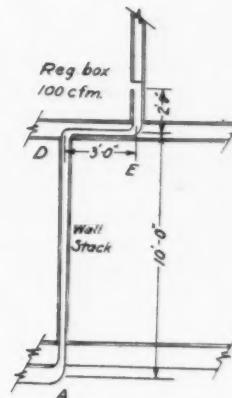


Diagram B

Care should be taken to draw from each room or series of intercommunicating rooms air equivalent to the amount designed to be delivered to the room or series or rooms; also that the total air to be returned shall in no case be less than the total equivalent supply of warm air to all rooms, unless compensated for by the admission of outside air.

It is suggested that equivalent air be introduced into the system from the outside to compensate for that vented from garages. A little outside air (approximately 5% by volume) is a good practice on all jobs.

**Item (b) Actual Length.**

The actual length of a rectangular or round Warm Air or Return Air run is the lineal feet of pipe or duct between the register and the furnace.

**Example 1. See Diagrams A & B. Fig. 2.**

Add lineal feet of stack from the register box along the line E, D, A, W, X, Y, Z, to furnace, equalling 42 feet, which is the actual length of that run.

**Item (c) Equivalent Length**

The equivalent length of a round or rectangular run is the total actual length, plus the equivalent lengths in straight pipe or duct, of all turns.

Assume all 90° turns equal to 10 feet of straight pipe or duct, and 45° turns and register boxes equal to 5 feet of straight pipe or duct. See Table 10 if more accuracy is desired.

**Example 2. See Diagrams A and B.**

Add equivalent length of register box to turns at E, D, A, W, X, Y, Z, and at furnace, equalling 75'. Add to this the actual length of the run,  $75' + 42' = 117'$  = total equivalent length of the run.

**Item (d) To determine bonnet temperatures.**

In order to compensate for temperature drops, between furnace and registers, it is necessary to compute the temperature of air at each register. From data collected in the field, it is safe to assume a temperature drop of  $\frac{1}{4}$  of 1 degree per foot under ordinary conditions. In Art. 5, Sec. 1, an average register temperature was arrived at by dividing the total building cfm by  $H_b$  and referring to Figure 1. This average register temperature represents the design temperature of a register located at a point one half the actual length of the longest run.

**Example 3.**

If the actual length of the longest run is 60 feet the average register temperature is the design temperature of a register 30 feet from the furnace.

**Example 4.**

If the longest run is 150 feet, the average register temperature is the design temperature at 75 feet.

Inasmuch as there is an assumed temperature drop of  $\frac{1}{4}$  of 1 degree per foot, the bonnet temperature is the average temperature plus  $\frac{1}{4}$  times  $\frac{1}{2}$  the lineal feet of the longest run.

**Example 5.**

Referring to Example 3 where the longest run was 60 lineal feet, the bonnet temperature would be the design temperature +

$$\left( \frac{1}{4} \times \frac{60}{2} \right). \text{ Assuming an average design temperature of } 135^\circ,$$

$$\text{the bonnet temperature would be } 135 + \left( \frac{1}{4} \times \frac{60}{2} \right) \\ = 135 + 7.5 = 142.5^\circ.$$

**Item (e)** Having determined bonnet temperature, the correct air temperature at any register may be computed by deducting from the bonnet temperature  $\frac{1}{4}$  of 1 degree for each lineal foot between the bonnet and that register.

**Example 6.**

Where the bonnet temperature is  $142.5^\circ$  and the register is 40 feet from the bonnet, the register temperature is:

$$142.5^\circ - (\frac{1}{4} \times 40) = 142.5^\circ - 10 = 132.5^\circ.$$

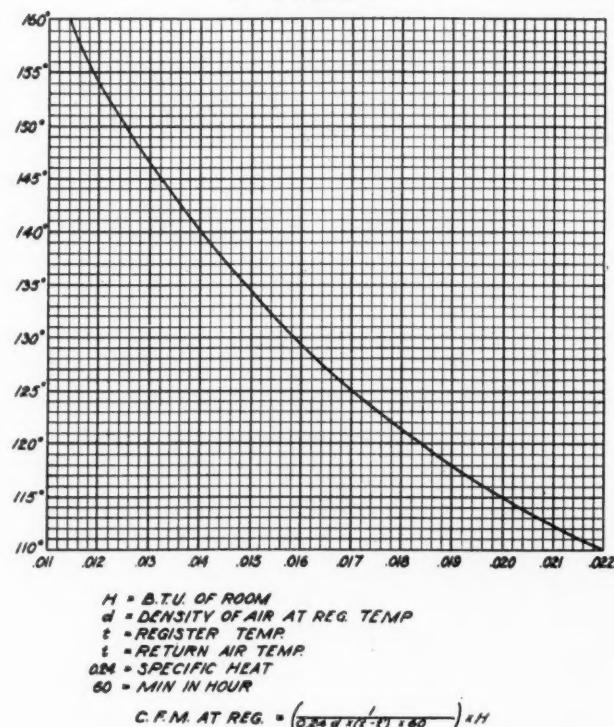
By the above method, compute the correct temperature at each register.

**Item (f)** In order to compute the correct cfm on each run, multiply the Btu load of each run, by the factor obtained from Fig. 1 corresponding to the correct register temperature.

**Example 7.**

Example 6 shows the air temperature of a certain register to

**Figure 1  
C.F.M. FACTORS**



be  $132.5^\circ$ . From Fig. 1 we find the cfm factor corresponding to  $132.5^\circ$  F. to be .0154. If  $H$ , the Btu's to be delivered by that register, were found to be 6500,  $6500 \times .0154$  would equal 100.1 cfm. In like manner find cfm of any warm air run.

**Item (g) Selection of Design Friction Loss.**

The total resistance to flow of air through ducts is due to two types of losses—friction losses and dynamic losses. This is equivalent to the friction losses in all straight runs, plus the dynamic losses in all elbows and turns expressed in terms of friction losses in equivalent length of straight duct.

The commonly accepted friction chart is shown in Fig. 3. In the use of this chart a fair recommendation would be to design the average systems, where the capacities of the trunk having the longest equivalent run requires as much as 1600 cfm, on a resistance of .06 inch; from 1600 to 2400 cfm on .08; from 2400 to 3600 cfm on .10; and from 3600 to 5500 cfm on .12 inch of water per 100 feet of equivalent length.

Where limitations of pipe size of any stack prevent the use of the above recommendations, the design static pressure may be arrived at in the following manner:

By observation select the run having the greatest resistance and find its total equivalent length. To determine this resistance, from Fig. 3, find the resistance in inches of water per 100 feet necessary to handle the required cfm through this duct of available size. Multiply this resistance per 100 feet by the total equivalent length and divide by 100. The result is the design static pressure of this run, as well as the design static pressure of the entire system provided it is within practical limits.

**Items (h) and (i).**

For individual round pipes refer to Table 6 for diameter required to handle cfm at design static. Correct for pressure differences due to unequal equivalent lengths by multiplying diameter of pipe by the correction factor corresponding to the total equivalent length from bonnet to register, as shown in Table 9.

**Example 8.**

The run in Example 7 was found to require a capacity of 100 cfm. If the design static were chosen at .06, the pipe diameter from Table 6 is found to be 6.8". If the register were found to have an equivalent length of 80 ft. from the furnace, the correct diameter can be found by multiplying 6.8

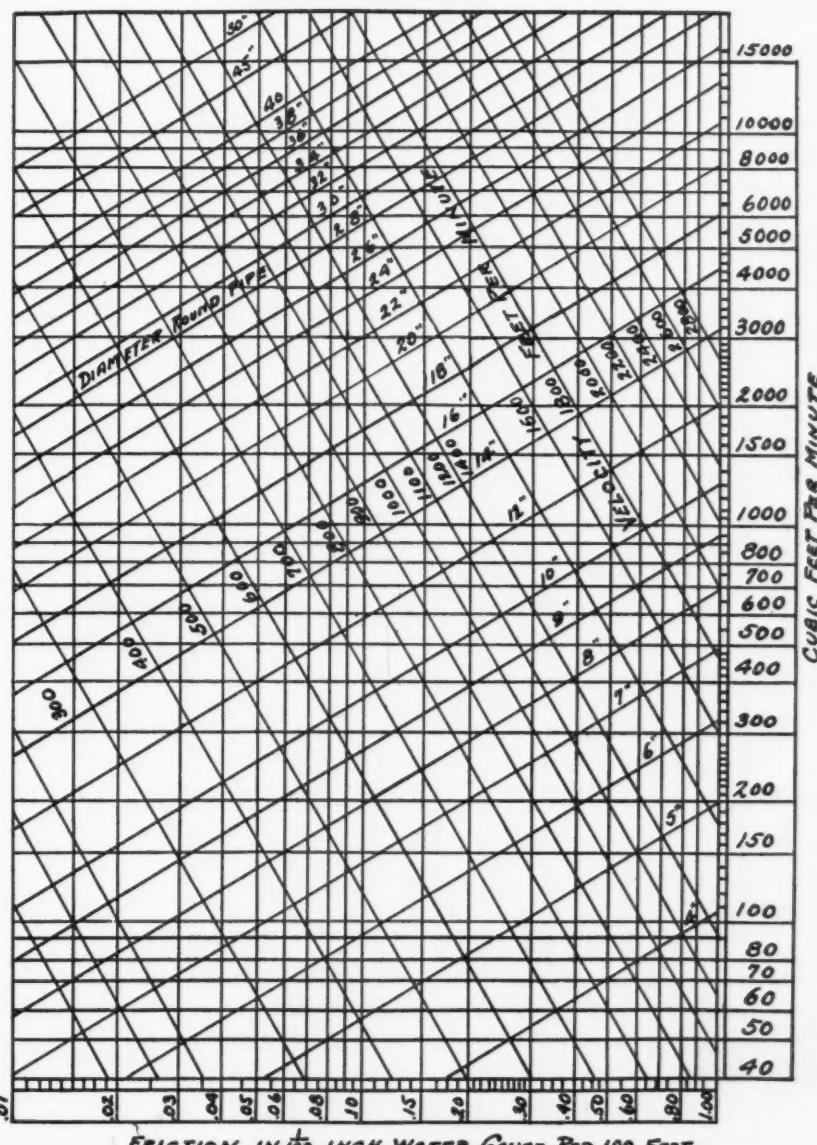
Table No. 8

## C.F.M. Capacities of Individual Round Pipes

<sup>a</sup>asterisk indicates Commercial Sizes.

					M. Pipe Size
.06	.08	.10	.12	.15	5.0*
cfm	cfm	cfm	cfm	cfm	
45	50	55	65	70	5.1
47	55	60	67	75	5.2
50	57	65	70	80	5.3
53	60	67	75	85	5.4
55	62	67	77	90	5.5
57	65	75	80	95	5.6
60	70	80	85	97	5.7
62	75	82	90	100	5.8
64	77	85	95	105	5.9
65	70	80	100	110	5.9
70	85	90	100	110	6.0*
75	88	95	105	120	6.1
75	85	100	105	125	6.2
78	90	102	110	130	6.3
80	95	105	115	135	6.4
85	100	110	120	140	6.5
90	105	115	125	145	6.6
92	110	120	130	150	6.7
95	112	125	135	160	6.8
100	115	130	145	185	6.9
105	120	130	150	170	6.9
110	125	140	155	175	7.0*
112	130	150	160	185	7.1
115	135	155	170	190	7.2
120	140	150	175	200	7.3
125	145	160	180	205	7.4
130	150	170	185	215	7.5
135	155	175	190	220	7.6
140	160	180	195	230	7.7
145	165	180	205	255	7.8
150	170	175	210	245	7.9
155	180	205	220	255	8.0*
160	165	210	230	265	8.1
165	190	215	235	270	8.2
170	195	220	240	280	8.3
175	200	230	250	290	8.4
180	210	240	260	300	8.5
185	220	250	270	310	8.6
195	225	255	280	330	8.7
200	230	260	285	330	8.8
210	240	270	295	340	8.9
215	250	280	305	350	9.0*
220	255	285	310	360	9.1
225	260	290	315	370	9.2
230	265	300	330	380	9.3
240	275	310	340	390	9.4
245	280	320	350	400	9.5
250	290	330	360	415	9.6
260	300	340	370	430	9.7
270	310	350	380	440	9.8
275	320	360	390	450	9.9
280	325	370	400	460	10.0*
290	335	380	410	475	10.1
295	345	390	420	485	10.2
305	350	400	430	500	10.3
310	360	410	445	510	10.4
320	370	420	450	525	10.5
330	380	430	470	540	10.6
335	390	440	480	555	10.7
345	400	450	495	570	10.8
350	410	470	505	585	10.9
360	420	480	520	600	11.0
370	430	490	530	615	11.1
380	440	500	545	630	11.2
390	450	515	555	640	11.3
400	460	525	570	655	11.4
410	470	535	585	670	11.5
420	485	550	595	685	11.6
430	495	565	610	700	11.7
440	510	575	620	720	11.8
450	520	585	635	730	11.9
460	525	600	650	750	12.0*
470	550	615	670	770	12.1
480	560	630	690	780	12.2
490	572	640	700	800	12.3
505	585	655	720	820	12.4
515	600	670	740	840	12.5
525	610	685	755	860	12.6
535	625	700	770	870	12.7
550	635	720	790	900	12.8
560	650	735	805	920	12.9
570	660	750	820	940	13.0
575	675	765	835	960	13.1
595	690	780	850	975	13.2
605	710	800	870	995	13.3
620	725	815	885	1010	13.4
630	740	830	900	1030	13.5
645	755	850	920	1050	13.6
660	770	865	935	1075	13.7
670	780	885	955	1095	13.8
685	795	900	970	1120	13.9
700	810	920	990	1140	14.0*
714	825	935	1010	1160	14.1
720	835	950	1030	1180	14.2
730	840	960	1040	1190	14.3
740	850	970	1050	1200	14.4
750	860	980	1060	1210	14.5
760	870	990	1070	1220	14.6
770	880	1000	1080	1240	14.7
785	905	1020	1110	1285	14.8
800	920	1040	1130	1290	14.9
810	940	1060	1155	1310	14.8
825	955	1080	1180	1335	14.9
840	970	1100	1200	1380	15.0
860	1010	1120	1220	1420	15.8
880	1060	1200	1300	1500	15.5
940	1090	1250	1360	1570	15.75
1000	1140	1310	1430	1640	16.0*
1040	1190	1370	1490	1710	16.25
1080	1245	1430	1540	1780	16.5
1125	1300	1500	1600	1800	16.75
1170	1350	1550	1670	1880	17.0
1220	1410	1610	1740	1990	17.25
1270	1465	1670	1830	2070	17.5
1320	1525	1740	1900	2150	17.75
1370	1585	1810	1980	2230	18.0*
1440	1645	1860	2060	2315	18.25
1490	1705	1920	2140	2400	18.5
1540	1765	1980	2200	2480	18.75
1600	1830	2060	2300	2480	19.0
1660	1900	2180	2380	2700	19.25
1720	1970	2240	2460	2800	19.5
1780	2040	2280	2550	2900	19.75
1820	2100	2410	2650	3000	20.0*
1860	2150	2500	2800	3200	20.25
1920	2240	2680	3000	3400	21.0
2120	2540	2880	3130	3680	21.5
2230	2660	2960	3310	3840	22.0*
2350	2840	3130	3500	4100	22.5
2490	3010	3310	3700	4350	23.0
2540	3190	3500	3920	4600	23.5
2680	3700	4100	4400	4800	24.0*
2720	3800	4200	4500	5000	24.5
3150	3790	4160	4710	5480	25.0
3240	4010	4430	5030	555	25.5
3540	4240	4710	5380	586*	26.0*
3750	4460	5030	5900	655	26.5
4100	4730	5390	6000	77.0	27.0
4440	5270	5900	6400	82.5	28.0*
4490	5560	6200	6800	85.5	28.5
4850	5900	6400	6900	89.0	29.0
5280	5950	6450	6950	92.5	29.5
5500	6400	6800	7300	95.0*	30.0*

## FRICTION CHART



by the correction factor corresponding to 80 ft. from Table 9.  $6.8 \times .965 = 6.56$ , or say, 6.6" in diameter. The above method will size and correct all warm air runs giving proper pipe diameters of runs up to two hundred feet of equivalent length.

Item (j) Sizing wall stacks and branches. See Tables 7 and 8.

Example 9.

Example 8 gave a pipe diameter of 6.6 to deliver 100 cfm, 80 feet of equivalent length from the furnace and at a static of .06. From Table 7 (Conversion Table of Round Pipe Diameters to Wall Stack Sizes), we find that a 10x4, an 11x3½ or a 13x3 stack will be satisfactory. The nearest commercial stack size in this case is a 12x3½. In like manner and by the use of Table 8, a 6x7, 5x8, 5x9 or 4x10 rectangular duct will satisfy the above conditions.

Item (k) Sizing trunk lines, in round pipe diameters.

Starting at the extreme end of the trunk line and working toward the heater unit, add the cfm of the first two or more branches joining at that point. Find the diameter of the trunk for that point from Table 6 using desired design static. To the cfm at this point add the cfm of the next branch joining the trunk and find the diameter of the trunk at this new location. In like manner add the cfm of each succeeding branch to the cfm of the duct at point of juncture.

(Continued on page 73)

An  
American  
Artisan  
Cooling  
Study

# Air Conditioning a New Zealand Furnace Works

By H. F. Purcell

Engineer, W. H. Harris Tinsmith, Ltd., Christchurch, N. Z.

**O**WING to the long distance between Chicago and New Zealand, the subject of heating and ventilating a dry cleaning plant as discussed in your October issue will probably be dead and buried before you receive this letter. Nevertheless, since we have had several experiences in ventilation problems, the results may be of interest to you.

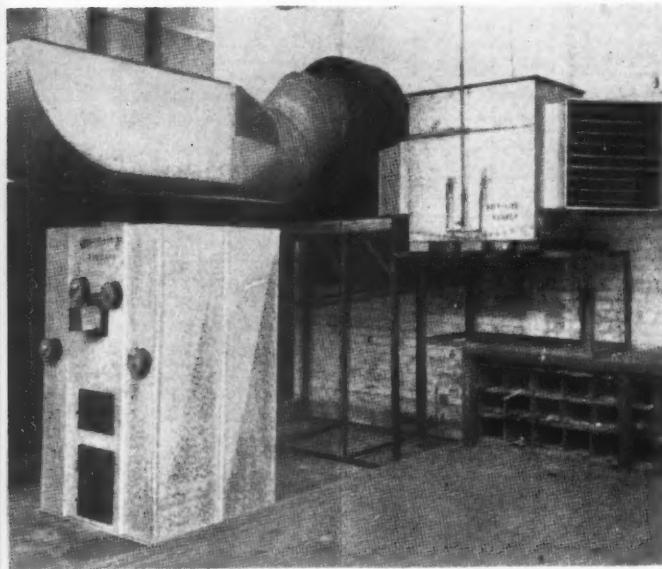
Our own works presented a problem which took quite a lot of solving and we agree with your own final paragraph thoroughly.

Our workshop covers an area of 200 feet by 60 feet, with eaves 14 feet high. The roof is of the sawtooth

The editors have had a pleasant correspondence with the author of this article. Mr. Purcell went to New Zealand several years ago and has been a pioneer in developing air conditioning in that country. One or two additional articles by Mr. Purcell will appear this year.

the outside and delivered through a trunk carried on the roof principals in each of the three bays, with downcast diffusers at 12-foot centers with outlets 9 feet from the floor. There were 48 of these diffusers each 6x6 inches and with two 6x6 inch outlets to each diffuser set at 45-degrees to the trunk each diffuser being reversed to the next one so that we had a pretty good network of cross currents.

After all this work, the result was practically nil. We thought that this lack of appreciable difference was due to the fact that the incoming air was too warm to achieve anything but movement of air so we



Left—A steel furnace manufactured by the company and used to heat the factory. At the right is a view of the main shop and skylighted roof. The author explains how a "blow in" system would not cool, but an exhaust system worked.



variety with a mean height of 8 feet above the eaves. The roofing is two-thirds corrugated asbestos and one-third glass.

We have frequent shade temperatures of from 90 to 95 degrees and we found that a usual temperature inside the building was 100 to 110 degrees. This owing to the fact that the asbestos roof accumulated the heat as it was admitted through the glass, notwithstanding that there was always a through draft from one end of the building to the other. Soldering fire-pots and welding plants did not help any, either.

Our first attempt was to install a large centrifugal fan which delivered 20,000 cubic feet per minute from

built and installed a large spray operated washer-filter unit using mains water at 50 to 56 degrees.

The result was still practically nil. Whilst the air at the outlets was around 60 to 65 degrees, the mean temperature in the shop was still over 90 degrees.

From the writer's point of view things were getting serious, we had spent a large sum of money and our men were still working under hothouse conditions which slowed up production considerably, to say nothing about the left handed compliments indicating the kind of engineer I was.

The next step was to figure out just why 20,000

cfm of air at 65 degrees made so little impression in a building with a cubical content of 200,000 c.f. We then found that we had a blanket of air with a temperature of 115 degrees in the space above the 9 foot level of the diffuser openings and that this heat simply radiated through the strata of reasonably cool air.

With this idea to work on we simply reversed the system. That is, we first of all disconnected all the diffusers so that they stood up in the peaks of the sawteeth. The outside intake was removed and the main trunks collected into one header which was connected to the inlet side of the fan. The washer-filter unit connected to the outlet side of the fan and fitted with directional louvres directing the conditioned air, diagonally across the building.

Under these conditions we have a normal summer

temperature of about 70 degrees which never exceeds 78 degrees under the hottest outdoor conditions. The outside doors are kept closed and we simply condition the air within the building, plus natural infiltration.

The plant is such that we have sold several large installations where similar conditions prevailed. In one installation, (a boiled sweet factory) where recirculation would not be satisfactory owing to the difficulty of extracting the sugar steam from the air we used a dual system, that is extracted the sugar laden air through reversed diffusers and trunks to the outside air with a second fan bringing fresh air from the outside through a washer-filter, but without a trunk system, the exhaust trunks apparently assisting in equalizing the distribution of the cooled air across the entire floor area.

## Place Air Intake to Avoid Pulling In Dust\*

By J. M. Pettingell†

**T**HE location of the outside air intake for an air conditioning system frequently lacks sufficient consideration of probable sources of fumes, odors and airborne solids; consequently troubles develop which could be avoided by more careful planning and investigation.

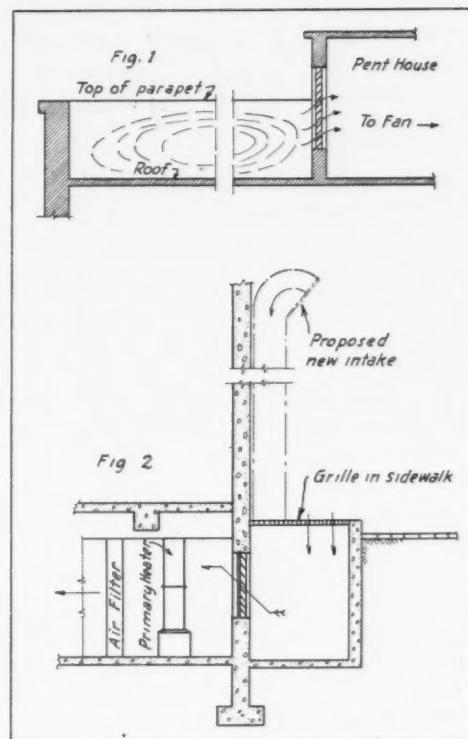
Intakes should be above ground level, removed from dust which is blown along the ground by winds. If the wind is strong, dust clouds may be visible, but much dust is so fine that it cannot be seen. Grilles in the sidewalk or at ground level and intakes through basement windows should be avoided.

Roof penthouse intakes should be higher than the parapet wall around the roof to avoid the dust, ash and soot which settle in such basins. Where there are nearby chimneys discharging smoke, ash and cinders from combustion and the cleaning of boiler tubes, a large quantity of dust is collected on the roof. This dust circulates around the roof and only a small amount may be blown over the parapet wall. If the intake is lower than the parapet, much of this dust will finally be drawn into the system. Another disadvantage of a low penthouse intake occurs on hot summer days when the air absorbs heat from the hot roof. See Fig. 1.

Intakes in pits, areaways, passageways between buildings and from rear alleys are undesirable, as such places are natural collecting points for dust. Hazardous conditions may even result, as was the case in a theater installation where the janitor made a practice of burning waste paper, programs and sweepings in an alley. The outside air intake was at street level in the same alley and once smoke and burning particles were pulled into the system and distributed over the auditorium.

The best location for an intake is on the side of a building above the level of wind-blown ground dust and with no roofs or horizontal surfaces extending in front from which accumulated dust and heated air can be drawn into the system. The intake should not be so high that it is in the direct path of smoke from neighboring chimneys.

Sometimes the intake is not in the best position because of appearance. In the installation shown in Fig. 2 it was decided to place the intake below grade with a grille in the sidewalk of an alley. It was known that this would cause heavy dust conditions, but no other arrangement seemed suitable. The amount of dirt, soot, fumes from automobiles, cigarette stubs and other refuse which has entered the intake has been enormous. A fine mesh screen was placed at the entrance, the areaway has been swept clean every other day but after five years the primary heater coils have deteriorated so much from the unusual conditions that they must be replaced. When this is done, it is also proposed to elevate the intake as shown.



\*Reprinted from Heating, Piping and Air Conditioning, March, 1937.  
†American Air Filter Co., Inc., Boston, Mass.

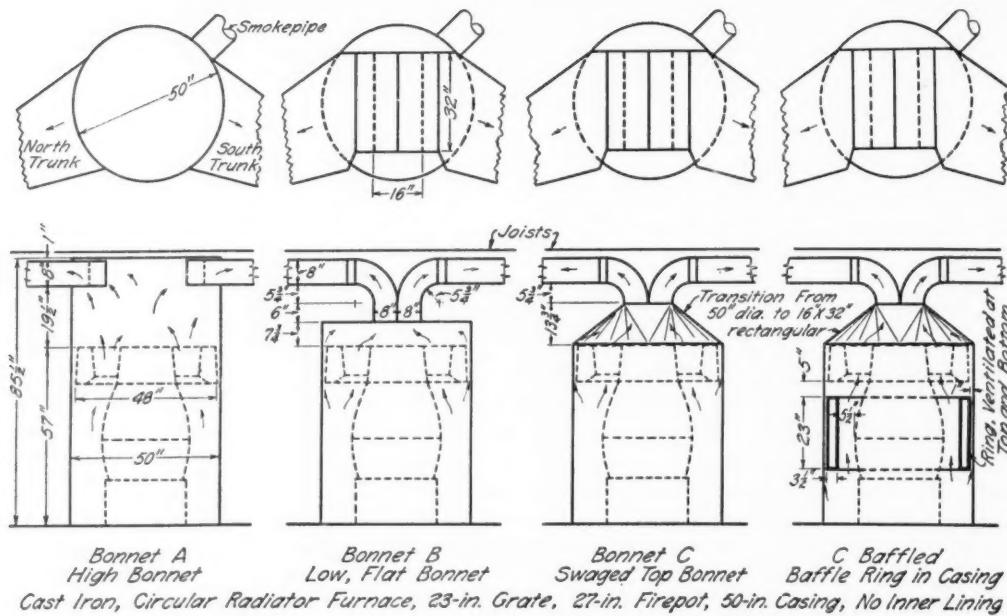


Fig. 1—Types of furnace bonnets and baffling tested in forced air installation in Research residence.

## Forced Air Heating Facts From the Research Residence

These discussions of some of the different types of duct systems are for the purpose of presenting the essential details of each, and to compare their respective advantages and disadvantages. Very little actual test data are available on the performance of these different systems. It is hoped, however, that a dissection of the theory and practice underlying each method may bring the strong points and weak points into greater prominence.

By S. Konzo

Special Research Associate  
Engineering Experiment Station  
University of Illinois

**I**N the preceding articles the most common methods of designing individual duct systems and trunk duct systems were presented in detail. These methods included the "velocity" method, the "equal friction loss" method, and the "reduction" method. These fundamental systems by no means include all of the modifications now in common use. In this article and the article to follow, the writer has included a discussion of three special systems that are important enough to require some consideration by all designers. These three systems are:

A. Extended Plenum Duct System

B. Overhead Duct System  
C. High Velocity Duct System

### A. Extended Plenum Duct Systems

In an attempt to reduce the frictional resistance in trunk ducts and also to more nearly equalize the lengths of the branch ducts leading to various rooms in a given structure, the "extended plenum" system has been used by many installers. Although no test data are available on this system, the main features can be subjected to an analysis that may indicate both the advantages and disadvantages that may be expected to accompany

the operation of the system.

The tests made in the Research Residence with the bonnet on the furnace casing extending up to the ceiling (Fig. 1—Bonnet A) had indicated that a large plenum chamber over the casing provided not only a simpler sheet-metal construction, but also provided for better mixture of the warm air. The plenum chamber over the furnace tended to equalize the static pressure existing at the entrance to the ducts leading from the bonnet.

In view of the success attending this type of plenum chamber construction, it is not surprising that some installers have extended the idea still further. A diagrammatic plan view of the "extended plenum" duct system is shown in Fig. 2. It may be noted that instead of providing for a gradual reduction in the cross sectional area of the main trunk, the trunk is made of uniform size for some distance away from the bonnet. Since a greater quantity of air passes point (a) than point (b), the air velocity at point (a) must also be greater than that at point (b). In other words, the air velocity in the extended plenum will not be uniform and will be less at the outlet than at the inlet. Hence, the velocity pressure in the duct will tend to become smaller as the air moves down the extended plenum and part of the decrease will result in an increase in the static pressure. That is, the regain in the static pressure will result in a more uniform static pressure in all parts of the extended plenum. This is shown in the pressure diagram in Fig. 2. In fact, whatever success has been attained with this method of installation is probably due to the fact that the static pressure avail-

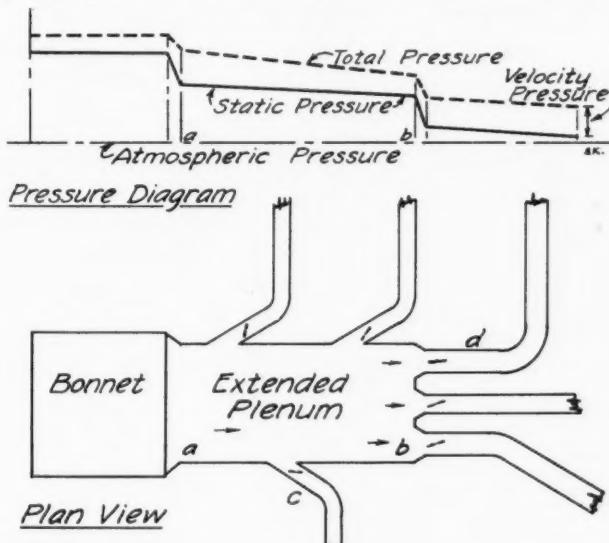


Fig. 2—Extended plenum duct system with simplified pressure diagram.

able at the beginning of each branch duct is more uniform in value than that which would have been attained had the ordinary type of trunk system been installed.

From this brief summary of the main characteristics of the "extended plenum" duct system one may speculate as to some of the advantages and disadvantages accompanying the operation of such a system.

1. Since the extended plenum duct is larger in size than is the usual trunk duct a greater amount of sheet metal is also required. The increase in the cost of the sheet metal may, however, be partly or entirely

offset by the decrease in the cost of fabricating and installing the simpler duct.

2. The use of the larger ducts will require more space in the basement and will be accompanied by slightly greater heat losses from the duct.

3. The size of the plenum chamber will be governed by the allowable air velocity in the bonnet take-off. In general, a low air velocity in the extended plenum will be desirable in order to minimize the frictional losses and in order to insure a more uniform static pressure in every part of the extended plenum. Since duct velocities exceeding 750 feet per minute are accompanied by large frictional losses and duct velocities less than 500 feet per minute require excessively large duct sizes, the working range will probably be between 500 to 750 ft. per minute. Therefore, a design velocity of 600 ft. per minute would be a reasonable one to use.

4. Any connection from the trunk duct to the bonnet (point *a* in Fig. 2) should preferably be of the tapered transition type in order to minimize the entrance losses that occur when the air flows from the bonnet into the extended plenum. It should be noted that in the case of an abrupt connection the relatively large losses at the entry may more than offset any reduction in the frictional resistance brought about by the use of the extended plenum.

5. This entry loss may also be of some significance in the case of the connections from the extended plenum to the individual branches. If, for example, duct (*c*) in Fig. 2 is very short, the combined frictional loss consisting of the:

$$( \text{Entry loss} + \text{duct frictional loss} )$$

may be materially less than the combined frictional loss for the longest duct (*d*) in the system. In this case the connection of duct (*c*) with the extended plenum may not require a tapered or transition connection. Many installations have been made with the branches butted into the trunk duct without tapered joints, transitions, or directional vanes. *It should be recognized that such installations are permissible only when the frictional losses in the duct are so small that the addition of a fairly large entry loss does not make the combined loss greater than that for the longest duct in the system.*

If, for example, duct (*c*) in Fig. 2 should be the longest duct in the given system, the use of an abrupt connection from the trunk duct to the branch duct merely superimposes an additional and unnecessary resistance that requires an increased power consumption by the fan. Hence, as a general practice, the use of sharp, right-angled connections without transitions or turning vanes is not recommended. Such connections should be allowed only when the limiting conditions of frictional resistance are well recognized and accounted for. Otherwise, the home-owner is penalized during the entire life of the heating system for a frictional loss that could be easily avoided.

6. The magnitude of the frictional resistance may be estimated from the data given in Harding and Willard's "Mechanical Equipment of Buildings," 2d edition, on page 673. These data are tabulated in Table 1. It may be noted that as the angle between the branch duct and the main duct increases, the pressure loss at the junc-

(Continued on page 78)



Some salesmen think that a sales talk is just an argument. A sale should be a process in which the prospect is shown the advantages of buying and his objections to buying NOW are pleasantly nullified. Originality has never been a problem as most prospects raise the same objections. What can be said? Here are a few suggestions.

**T**RAVEL, they say, is broadening to anyone. To a salesman or a merchandiser with a keen ear and a sharp eye, it should be more. It should open profit gates ordinarily locked tightly. It should save time—the essence of a salesman's existence—and labor—wouldn't we all liked to be relieved of that.

So let's suppose for a few moments then, that we can move around the country at will, listening in on salesmen. Salesmen out on the firing line, salesmen making and missing orders. How do they overcome sales resistance? How do they make their appointments? How do they get the orders for automatic heating and air conditioning equipment?

A salesman's job is to blast sales resistance into smithereens, so first we'd better look with an analytical eye at some of the most common forms of this barrier to signed orders.

First of all, we know that prospects in the east, west, north and south all say, "See me later"—"It's too costly"—"I have a friend who wasn't satisfied"—and offer all the other common reasons why they should not buy.

But, we know, too, that the right answer to these resistances in one locality works in other territories. Why? Because human nature is the same the country over.

After all—people are people.

#### "It's Too Costly"

Let's take as a starter one of the most common of all resistances, "It's too costly." How many times have you heard 'em say that. The prospect who hands it to you simply means that up to that point he hasn't seen enough advantages to him. It is his natural impulse to duck the issue anyway, and so he says it's too costly. You're trying to sell him automatic heating and winter air conditioning. It doesn't matter whether the equipment involved is oil, stoker, or gas. The sales principle is the same. You've got to show him that the comfort—convenience—health and other advantages are worth what he considers the extra cost.

Suppose we listen in on an actual case study of a successful salesman handling Mr. "It costs too much." Remember, the word for word dialogue given here is of no particular value. Chances are, you couldn't or

By R. Louis Towne

wouldn't want to speak as this salesman spoke, but the idea is what you're after.

Salesman: Mr. Harper, you say the equipment I offer you—the comfort, convenience, the contribution to health the system gives—costs too much? May I ask one question?

Mr. Harper (Prospect): Sure, go ahead.

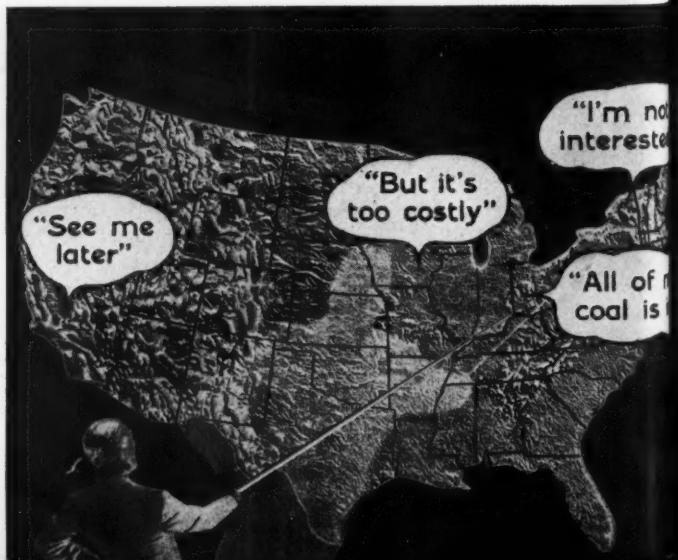
Salesman: Well, Mr. Harper, just what do you work for?

Mr. Harper: Why—a—well, I guess to make money—to—a—live—to take care of my family.

Salesman: Exactly. You work to make money—so do I, so does everyone. But the only reason we want money is to buy some of the conveniences, some of the protection to health, some of the leisure that is in life. Isn't that a fact?

Do you see what this salesman has done? He has made his prospect admit that he wants and needs some of the best things in life. The prospect is led to change his sense of values. To consider his expenditure—not

Below—Prospects in the north, the east, the west, the south—all raise the same objections. And the same answers serve for all.



in dollars and cents—but in what it will bring in better living.

Then our salesman goes on. He switches away from a cost objection deadlock and starts selling an idea like this:

Salesman: Mr. Harper, did you ever consider the value to you and your family of an extra room. It might be a playroom for the children or a recreation room for the whole family.

Mr. Harper: Yes, we thought some of adding to the house but it would cost too much.

Salesman: Well, yes, Mr. Harper, ordinarily it would be quite an expenditure. But let's look at it this way. Suppose you installed automatic heating—

And he immediately shows in picture form the changing of the basement from the ordinary catch all to the room that it can be—at practically no extra cost. But the important thing is that he's selling an *idea*. He resells the fundamental convenience, comfort, health, leisure his equipment gives—*plus pleasure* in that extra room. The extra cost becomes secondary and sales resistance is blasted away.

#### "I'll Think It Over"

Another objection that often drives house heating salesmen nearly mad is the oldest stall in the bag—"It sounds good—I'll think it over." Let's listen to another successful salesman handle the hard nut who springs it. It's not a difficult situation.

Salesman: Mr. Bowers—just what is it you want to think over?

Mr. Bowers: Well—a—just the whole thing.

Salesman: But the *whole* story is right here before you and Mrs. Bowers . . . by thinking it over right

nience, better health, more leisure and the saving of time and energy. In thirty mintues, he's again ready for the order blank and he uses a strong closing something like:

Salesman: In the last place, then, Mr. and Mrs. Bowers, you're actually paying *now* for the best heating equipment in money, mental anxiety, disposition and all of the other things but you just haven't had it delivered.

As he leaves his prospects, that salesman probably doesn't exactly know what point sold the job, but the one thing he does know is that the best way to "Think it over" is right with the prospect, sticking and sticking



When the prospect says—"I'll think it over," think it over right with him. Don't let your sales advantages cool off.

until the prospect is led again and again up to the point of closing.

And now for the man we'd often like to haul off and knock into the middle of next week. He's the hard boiled buyer, the fellow who knows "*all about it*." He probably greets you with something like this:

Prospect: Say, you can't tell me anything about these air conditioning gadgets. I know *all* about 'em. They're too expensive.

Salesman: Well, it certainly is fine to meet someone who can talk comparative costs.

Prospect: Comparative costs—who said anything about that. All I know is that friends of mine with automatic heating say it's killing 'em with expense.

Salesman: Just *how much* is it costing them for the type of homes they're heating?

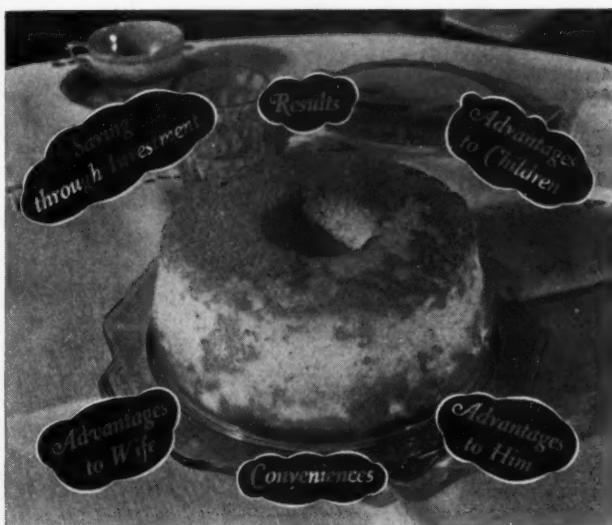
Prospect: I don't know, but it's plenty. They're going to take 'em out.

Salesman: But have they? *As you know*, the advantages far outweigh the question of costs in whatever you buy and use—don't they? Now, let's take a few moments to look at the facts in this book I have here. Then, you be the *judge*—I know you'll appreciate the absolute lowdown.

*As you know . . .*

And so he continues to use the expression AS YOU

(Continued on page 76)



You have to whet your prospect's appetite for the things you are selling. Your proposition is a cake ready to be cut into advantage slices.

now, the facts will be more clear—and if there are any questions—I'm right here to answer them.

He doesn't wait for an answer. He proceeds. His presentation is reopened and he again sells hard on his story. He guides the thoughts of his prospects on the advantages to *them* of more comfort, greater conve-

# A Chart for Reading CFM Directly from BTU Loss

By L. S. Oswald

Akron, Ohio

**T**HE calculation of air volume over a considerable range of register temperatures used in air conditioning work can be simplified by the use of the straight line graphs shown with this article.

As explained by S. Konzo, special research associate, Experimental Station, University of Illinois, in his series of articles on residential Winter Air Conditioning, published in the American Artisan, the amount of air required to convey heat to any room at a specified register temperature and predetermined return air temperature is calculated from the formula:

$$\text{CFM} = \frac{\text{Heat loss}}{60 \times .24 \times \text{density of air at the register} \times (\text{Temperature of air at the register minus Return air temperature})}$$

If, for example, in the foregoing equation the value .0652 is the density of air at 150 degrees and the temperature of the air return to the fan is 65

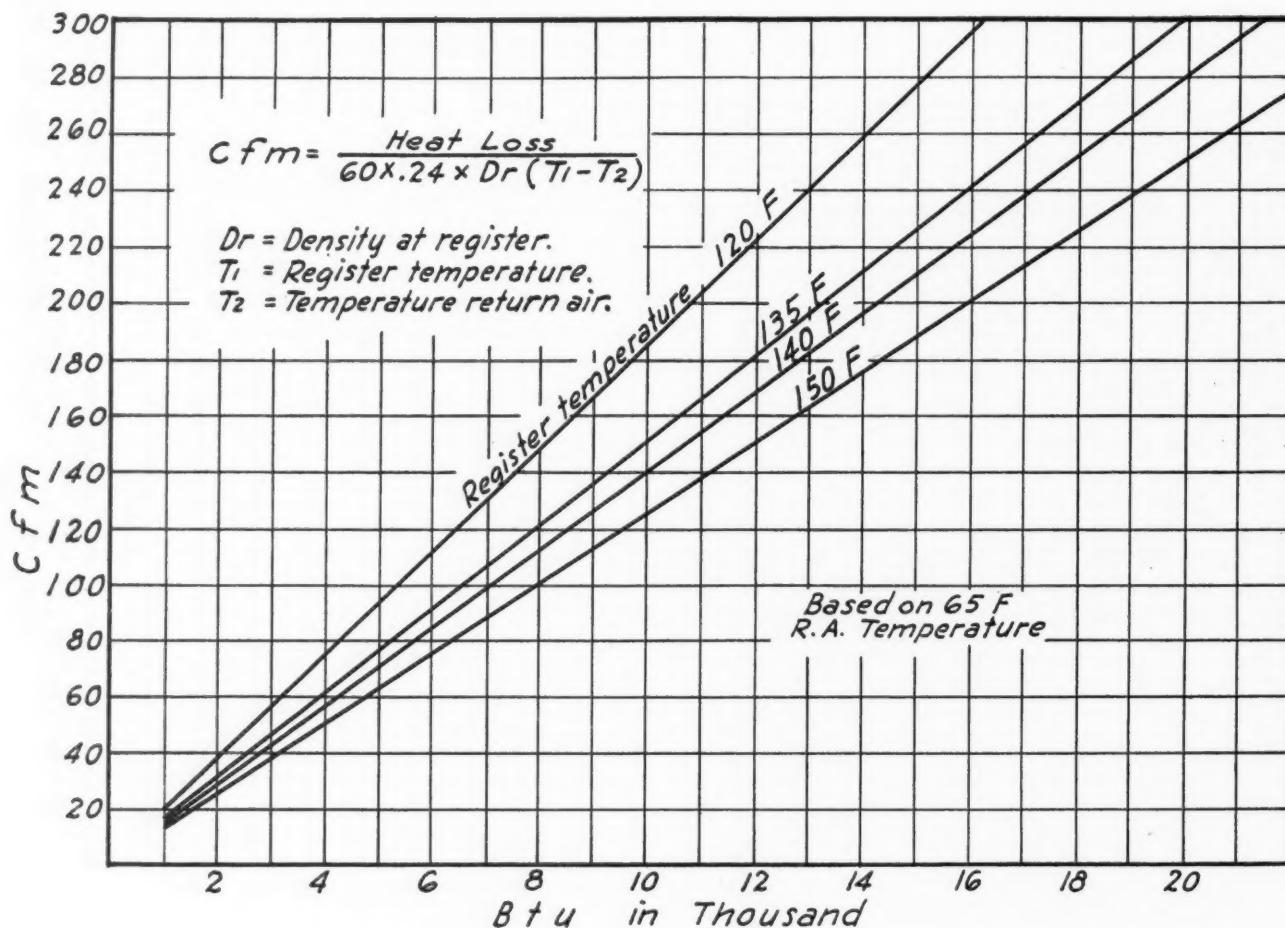
degrees Fahrenheit, then for a heat loss of 1 Btu (one becomes unity) .0125 cfm is required to carry this quantity of heat. Thus .0125 becomes a factor for the air at the condition stated and when multiplied by the heat loss becomes the quantity of air required to convey the heat.

The general conditions outlined in paragraph three form the basis for the calculations used in preparing the accompanying graph. A more familiar formula will be given later.

The base line of the chart is divided in units of 100 Btu with a range of 1,000 to 22,000 Btu. At the left hand margin air volumes required to carry this heat at varying register temperatures with a return air temperature of 65 degrees Fahrenheit are plotted in units of 2 cfm with a range of 20 to 300 cfm.

Register temperatures are represented by diagonal lines.

An example follows: A room having a heat loss  
(Continued on page 75)



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amples and illustrations what happens when certain conditions prevail and what results can be expected when recommended procedures are applied. Facts established by outstanding engineers and research bodies have been drawn upon freely in order to make this book a clear reflection of the latest thinking of the entire industry.

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| 7—Return Air Systems                      | 19—Casing Baffling                         |
| 8—Selecting Register Temperatures         | 20—Chimneys and Drafts                     |
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## Neubecker—Air Conditioning Fittings

(Continued from page 58)

### Patterns for Double Offset Crossing Girder Obliquely

Note in Fig. 12 that the oblique duct has been turned in a horizontal position to more clearly show the principles involved. In line with the girder, the double offset and section of girder is drawn and represent a section at right angles to the girder line or on the line  $V-W$  and is a reproduction of the offset shown in Fig. 11. In line with the top of the girder in Fig. 12, draw the ceiling line  $X-Y$ . Now space the bottom curvatures of the offset in equal divisions as shown by the small figures 1 to 9. From these points at right angles to  $X-Y$  draw lines to intersect the line of the duct  $R-T$  in plan, the ceiling line  $X-Y$  and the upper curvature of the offset from 10 to 18, all as shown. From the intersections on and at right angles to  $R-T$  drop lines indefinitely downward and crossing the line  $X^{\circ}-Y^{\circ}$  which is drawn parallel to  $R-T$  at pleasure.

Now measuring in each and every instance from the line  $X-Y$ , take the various vertical distances to the various intersections along the upper curve 10 to 18 and the lower curve 1 to 9 and set them off, measuring from the line  $X^{\circ}-Y^{\circ}$  on lines of similar numbers, thus obtaining the points of intersections in  $O$ . Trace a line through points so obtained, then will  $1'-5'-9'-10'-18'$  be the true elevation of the double offset on the line  $R-T$  also the pattern for the sides. The method of developing this pattern maintains the full area throughout the offset as the curves are parallel to each other.

When developing this double offset in practice it is only necessary to develop one-half because the opposite curve is similar, making a joint along the center  $O$  with a drive cleat. Edges must be allowed for Pittsburgh lock or double seam as desired. So that straight lines can be obtained on the heel and throat patterns for Pittsburgh or hammered lock, the patterns will be laid out by a short rule, which, while not geometrically accurate, is accurate enough for all practical purpose and has been used in practical work.

The method will be described for laying out the pattern for the *heel* only, which, however, will be the same when developing the pattern for the *throat*.

Take the girth of the heel, or lower curve, 1 to 7 and lay it off on any horizontal line as  $1^{\circ}$  to  $9^{\circ}$  in the lower left hand corner. From  $1^{\circ}$  erect the perpendicular  $1^{\circ}-U^{\circ}$  equal to the projection from  $W$  to  $U$  in the plan and draw a line from  $U^{\circ}$  to  $9^{\circ}$ . Take the distance from  $U$  to  $T$  in plan and set it off in the pattern from  $U^{\circ}$  to  $T^{\circ}$  also on the perpendicular line  $9^{\circ}$  to  $T^{\circ}$ . Draw a line from  $T^{\circ}$  to  $T^{\circ}$ . Then will  $T^{\circ}-9^{\circ}-U^{\circ}-T^{\circ}$  be the net pattern for the heel, to which laps and edges must be allowed for locks.

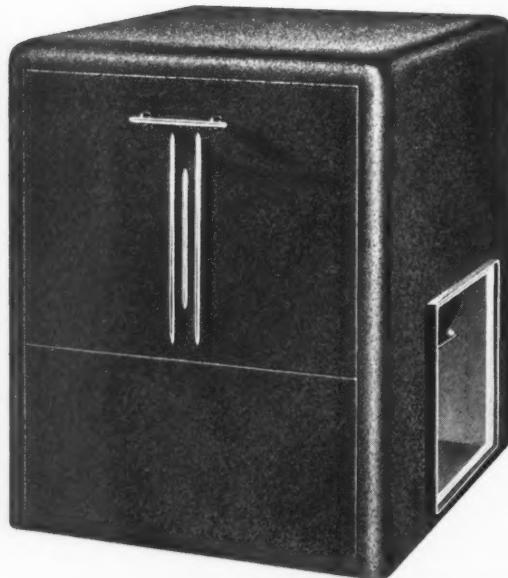
So that a cross joint can be made with the right angled ends of the duct as at  $T-S$  and  $T^{\circ}-V$  in plan, the triangular piece  $T-U-S$  and  $T^{\circ}-V-R$  must be added to the pattern as follows: With  $U-S$  in the plan as radius and  $U^{\circ}$  and  $T^{\circ}$  in pattern as centers, describe the arcs  $a$  and  $a'$  which are intersected by arcs struck from  $9^{\circ}$  and  $T^{\circ}$  as centers with radius equal to  $T-S$  or  $T^{\circ}-V$  in plan. Draw line in the pattern from  $T^{\circ}$  to  $a$  to  $U^{\circ}$  and  $9^{\circ}$  to  $a'$  to  $T^{\circ}$ .

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*Write for 1937 catalog, performance data and prices.*

**The LAU Blower Company**  
Dayton, Ohio

## New Technical Code

(Continued from page 63)

Example 10. Analysis of one complete run.

Referring to Diagrams A and B, Fig. 2, and Example 2, assume the run A to be the end run of the trunk line. This run must handle 100 cfm and its equivalent length is 117 (use 120) feet. Assuming a design static of .06 the round pipe diameter is 6.8, see Table 6. From Table 9 (correction table)  $6.8 \times 1.035 = 7.038$  (say 7.1) inches, the corrected round pipe diameter of the branch.

Adding the 300 cfm of the first branch (B) to join the 100 cfm of the branch A we find a total of 400 cfm. From Table 6, 400 cfm at .06 static gives a pipe 11.4" in diameter.  $11.4 \times 1.035 = 11.799$  (say 11.8) inches, the corrected pipe diameter.

Table No. 9

Correction Tables for Pipes of Unequal Equivalent Lengths

Equivalent Length of Round Pipe in Feet	Correction Factor
200	1.150
190	1.140
180	1.125
170	1.115
160	1.090
150	1.075
140	1.065
130	1.050
120	1.035
110	1.020
100	1.000
90	.985
80	.965
70	.95
60	.905
50	.87
40	.835
30	.785
20	.725
10	.65

The above table is for the purpose of correcting the diameter of round pipes of unequal equivalent lengths, in order that any or all pipes, regardless of their equivalent lengths, will handle any required cfm at the same predetermined static pressure.

Adding the 500 cfm of C to the 400 cfm of A and B we have 900 cfm. 900 cfm at .06 static gives a pipe 15.5 inches in diameter.  $15.5 \times 1.035 = 16.04$  (say 16.0), the corrected pipe diameter. In like manner 200 cfm at D plus 900 cfm of A + B + C = 1100 cfm. 1100 cfm at .06 = 16.75.  $16.75 \times 1.035 = 17.35$  (say 17.4), the diameter of trunk line at furnace.

Item (l) In order to correct the trunk line to bring about the design static regardless of its length, it is necessary to multiply the diameter of the trunk between branches by a common correction factor. This factor is the same factor used in correcting the diameter of the branch with the greatest equivalent length, regardless of the point of intersection with this trunk.

Should two trunk lines merge, treat each as individual trunks to point of intersection. Total cfm of each trunk at this point and proceed as one trunk.

If there are two or more trunk lines to the furnace, design and correct each trunk as outlined above.

Item (m) Refer to Table 8 for rectangular equivalents.

Item (n) Size return air trunks and branches, or individual ducts or pipes in the same manner as on the warm air side of the system.

Item (o) Total resistance of entire system.

To find the total resistance of the entire system, it is necessary to add together the resistances offered by every portion of the entire system.

As the warm air and return air sides of the system are designed on a definite static pressure, and all runs corrected to offer this same static pressure, it is apparent that the design static of the circulating system is the sum of the two.

ROUND OUT YOUR  
AIR CONDITIONING  
LINE!

WITH A  
**HEXCEL**  
ROOM COOLER



List  
Price

\$79<sup>95</sup>

Now is the time to prepare for that summer "room cooling" business which will start within the next thirty days . . . and if you are lined up with Hexcel when it does start you will have a decided advantage, for the Hexcel Room Cooler operates with circulating water extremely efficiently, very silently and with a minimum of cost. Its heavy duty blower forces pre-cooled air to every corner of the room . . . its sturdy construction assures its lasting indefinitely and its attractive appearance is a decided sales feature. It is simple to install and each installation yields a fine profit for the dealer. Investigate this Hexcel Room Cooler NOW . . . send for complete information and prices . . . use the coupon.

### SPECIFICATIONS

Height . . . 54½"

Width . . . 18¾"

Dia. of Base . . . 17¾"

Weight . . . 80 lb.

Finish . . . Brown crackle lacquer with chromium trimming

Model "AA" Room Cooler having 16" fan, larger in size and with a 40% greater efficiency than model illustrated can be furnished for \$112.50.

**HEXCEL RADIATOR CO.**  
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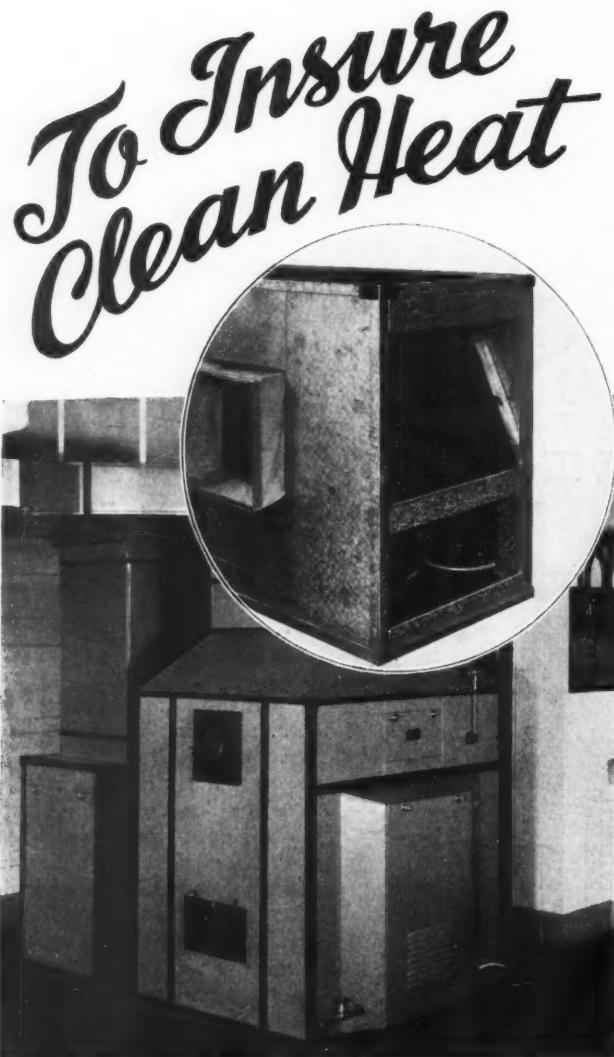
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Table No. 8

Conversion Table of Round Pipe Diameters to Rectangular Ducts 7 - 8 - 9 - 10 - and 12" Deep

Round Pipe Diameters in inches Equivalent to the Following Rectangular Sizes.					Width of Duct
7" Deep	8" Deep	9" Deep	10" Deep	12" Deep	
5.0	5.2	5.5	5.8	6.3	3
5.8	6.1	6.5	6.8	7.4	4
6.5	6.9	7.3	7.7	8.3	5
7.2	7.6	8.0	8.4	9.2	6
7.7	8.2	8.7	9.2	10.0	7
8.2	8.8	9.3	9.8	10.7	8
8.7	9.3	9.9	10.4	11.4	9
9.2	9.8	10.4	11.0	12.0	10
9.6	10.2	10.9	11.5	12.6	11
10.0	10.7	11.4	12.0	13.2	12
10.4	11.1	11.8	12.5	13.7	13
10.8	11.5	12.3	12.9	14.3	14
11.1	11.9	12.7	13.4	14.7	15
11.4	12.3	13.1	13.8	15.2	16
11.8	12.6	13.5	14.2	15.7	17
12.1	13.0	13.8	14.6	16.1	18
12.4	13.3	14.2	15.0	16.5	19
12.7	13.6	14.5	15.4	17.0	20
12.9	13.9	14.9	15.7	17.4	21
13.2	14.2	15.2	16.1	17.8	22
13.5	14.5	15.5	16.4	18.1	23
13.8	14.8	15.8	16.8	18.5	24
14.0	15.1	16.1	17.0	18.8	25
14.3	15.4	16.4	17.3	19.2	26
14.5	15.6	16.7	17.6	19.5	27
14.8	15.9	17.0	18.0	19.8	28
	16.1	17.2	18.2	20.2	29
	16.4	17.5	18.5	20.5	30
	16.6	17.7	18.8	20.8	31
	16.9	18.0	19.1	21.1	32
	18.2	19.3	21.4	23.3	33
	18.5	19.6	21.6	23.5	34
	18.7	19.8	21.9	23.8	35
	19.0	20.1	22.2	24.0	36
		20.3	22.5	24.3	37
		20.6	22.8	24.5	38
		20.8	23.0	24.8	39
		21.1	23.3	25.0	40
			23.5	25.2	41
			23.8	25.5	42
			24.0	25.8	43
			24.3	26.0	44
			24.5	26.2	45
			24.8	26.5	46
			25.0	26.8	47
			25.2	27.0	48

The total resistance against which the fan must operate is, therefore, the resistance of the circulating system, plus the resistance of that register on warm air and return having the greatest resistance, plus the resistances of the heater, filter (usually .05), washers, cooling coils, eliminators and other appurtenances.

### Example 11.

Assuming the design static of each system (warm air and return) to be .08, add the following:

.08 (warm air side) + .08 (return air side) + .03 (assumed static of register offering greatest resistance on warm air side) + .02 (assumed resistance of register offering greatest resistance on return air side) + .05 (resistance of furnace) + .10 (resistance of filters, partially dirty) = .36 static resistance against which the blower must operate.

### Item (p) Selection of Blowers.

The blower capacity at 65° return air should be the equivalent of, or greater than, the sum of the cfm required to supply all the outlets at the design Warm Air temperatures, and at the total pressure of the entire system. It is assumed that all blower ratings are in accordance with the Standard Test Code of the A. S. H. & V. E. Guide.

### Item (q) Filters, Washers and Cooling Coils

It is recommended that all furnaces be provided with some method of cleaning the air. In the case of filters it is recommended that the maximum velocity through the filters should not exceed 200 feet per minute. Use manufacturer's ratings for resistances and efficiencies. Generous filter areas are advisable to counteract reduced capacities and increased resistances when dirty. When washers are used, use manufacturer's ratings as to capacities and resistances. When cooling coils are used, use manufacturer's recommendations as to velocities through coils and their ratings for resistance.

## Item (r) Registers and Grilles

Use registers and grilles of proper size and area. Same to be full width of stack. Use manufacturer's ratings for volume, velocities and areas as required.

When warm air registers are placed in the baseboard, or just above the baseboard, they shall be sized on a basis of not more than 300 feet average velocity. Downward deflecting registers permit velocities up to 500 feet per minute.

When registers are placed above the breathing line, (register top 18" below ceiling) they shall be sized on a basis of 500 feet minimum velocity, excepting in bath rooms and toilets. Such registers must be horizontal or slightly downward direction of flow. Where the distance from the register to the opposite side of the room is over 15 feet, higher velocity should be used.

All baseboard or wall warm air registers, either high or low, shall be properly sealed to the stack head or register box in such a manner as to prevent any leakage of air between the head and the register.

Back pressure louver type registers must be used in garages.

The resistance through registers varies with design and velocity. Consult manufacturer's catalog for data.

All return air registers *should* be at the floor line.

### Chart for Reading C F M

(Continued from page 70)

of 5,000 Btu hourly is heated by a volume of air delivered at 150 degrees Fahrenheit. Starting at the base line marked 5,000 read along the vertical line to the intersection of the diagonal marked 150 degrees. From the intersection follow the horizontal line to the left and read 63 cfm. Had the factor .0125 been multiplied by 5,000 the answer would have been the same.

If the required condition had called for air delivered at 140 degrees, the air volume would be 70 cfm.

A formula probably more familiar to the average estimator would be as follows:

CFM =

Heat Loss × Air Volume at Register Temperature

$$60 (\text{Tr} - \text{Tra})$$

Tr = Temperature of air at Reg.

Tra = Temperature of Return air.

The tendency has been to use 55 cfm as the volume of air at the register although this is an error as it applies only to the amount of air which can be raised one degree Fahrenheit by the application of one heat unit at 70 degrees.

If air delivery temperature is 150 degrees Fahrenheit and the volume 63.37 then this becomes Unity and constructing an equation we have:

$$\text{CFM} = \frac{1 \times 63.37}{60 (150 - 65)} = .0124$$

The percentage of error is 1/1000 as against the more accurate equation using air density.

WILL THE HEATING  
EQUIPMENT YOU SELL  
STAND UP FOR

25 years



Any prudent man will agree "it takes mighty good merchandise to stand up for 25 years." Yet that is the duration of the Rudy warranty on its coal, oil and gas furnaces. Before you take on any line, consider the value of the Rudy guarantee to you and your customers.  
THE RUDY FURNACE COMPANY, DOWAGIAC, MICH.

RUDY

FOR LEADERSHIP LOOK TO THE LEADER

April, 1937

## I Am Not Sold

(Continued from page 69)

KNOW until the prospect finally has to agree with him to make him think he really does know all about it. This hard nut is not hard to handle. In fact, he's one of the easiest if you don't let his bulldog qualities get you down.

### "I'm Not Buying"

Another in our list of regular and maddening resistances is given us by the fellow who at the end of a bang up presentation leans back in his chair and says:

Prospect: Nope—I'm not spending a cent right now for anything.

He's a qualified prospect. You know he needs what you have to offer. How are you going to sell him? Look around you as you talk to him. His home is furnished nicely. Chances are he has a fairly new car in the garage. He can't mean he can't afford to buy modern heating and air conditioning equipment. He's just the kind of a fellow who, given a beautiful angel food cake would look through the hole and predict rain.

But he has been sold—he can be sold—and contractors are selling his type every day. If you can make him bite into the cake, he'll smile with the same well-sold satisfaction everyone has over a good purchase.

When this man says to you, "Say—the way things

are going, I don't even know if I can keep the house. I'll certainly get no vacation this year." Don't let him fool you. He may have an even thousand in the bank. Hit him with facts—but most important, get him into an optimistic mood. The salesman on this interview said:

Salesman: Things aren't bad—you'll keep this house and speaking of that vacation—how'd you like to have a permanent one from tending the furnace.

You see that salesman was whetting Mr. Poormouth's appetite for the good cake. He was tabooing his pessimistic remarks and appealing to his instinctive buying urge. He used the same tactics as he explained that the biggest little investment the prospect could make in his house was by way of automatic heating for saving time—saving money—saving worry. He hit the word—*saving*—hard. He sold Mr. Poormouth with his own ammunition.

### "No"—Then Begin to Sell

Naturally, we can't handle all sales resistances here. But these common ones will help you to see that they all can be overcome if you start on the right tack. For, in the last analysis, the prospect who says "No!" for any reason is simply crying loudly, as if through a Megaphone, "I am not sold." That's when we should begin to sell—not quit.

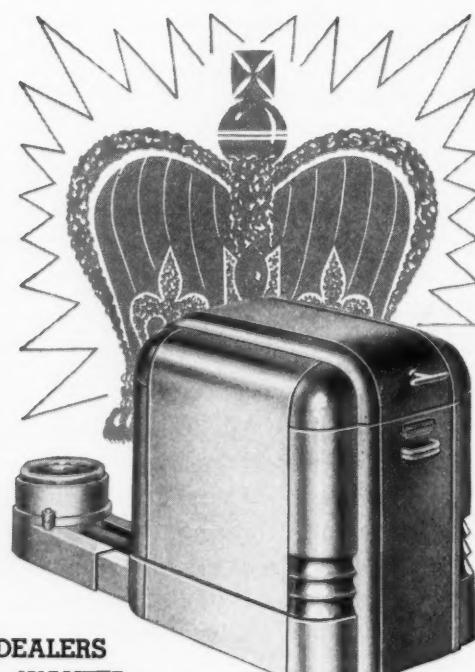
(Next month we'll handle the bugaboo of all selling—Closing the sale. In the discussion we'll see why "Close isn't closed.")



## CONCO—the New Ruler IN THE STOKER EMPIRE

The stoker that's in the news . . . noble in design, an aristocrat in appearance. Behind it a royal ancestry of 15,000 installations. The toast of stoker dealers everywhere because it's the royal road to profits. Join in our Coronation!

**CONCO-SAMPSEL STOKER CORPORATION**  
DIV. OF H. D. CONKEY & CO.

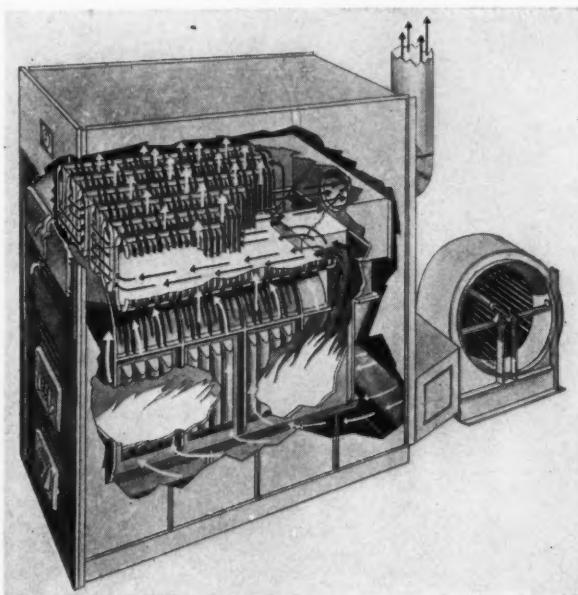


### DEALERS WANTED—

Dealerships available to those who want a simplified, trouble-free stoker that has everything: dealers who know the value of sales helps and advertising; dealers who want a full range of sizes serving both domestic and commercial fields. Write us today for information regarding the Conco franchise.

# The ACME HEATER

*"It's in the Fins"*



PHYSICAL DATA—LARGE SERIES

Size No.	Dimensions			Grate sq. ft.	Heat Surf. sq. ft.	Free Area sq. ft.	Wt. Lbs.	Max. Capacity Btu.
	Length	Width	Height					
7	6'-6"	4'-0"	7'-0"	10.31	260	6.55	10,25	5000
8	8'-1"	4'-0"	7'-0"	11.91	340	7.73	12,50	7000
9	9'-8"	4'-0"	7'-0"	13.06	430	8.91	14,75	8000
10	11'-3"	4'-0"	7'-0"	14.43	500	15.82	22,62	9300

Note: For Automatic Firing Add 10% to Ratings Given.

## Burns Any Kind of Fuel

The design of an all cast iron, direct transmission heater, such as the Acme, is not dependent upon the kind of fuel to be used. Any type of fuel may be burned. Suitable grates may be provided so that bituminous, semi-bituminous, anthracite coal, or other solids may be used with equal efficiency. Replacement of grates and linings by proper refractory material permits the use of automatic stokers on oil burning equipment.

## Large Combustion Chamber

The Acme Heater provides ample space for the ignition of gases of combustion, regardless of the kind of fuel used. The unusually large combustion chamber, acting as "primary" heating surface, effects a very efficient transfer of heat, because of the great temperature difference between the burning gases inside the chamber and the air passing over the outside surface.

## Efficient Radiator Section

Although the heating surface of the combustion chamber is large and efficient, still more heat must be extracted to obtain satisfactory overall efficiency. An inspection of the "phantom view" above will reveal how the gases of combustion enter the rear smoke chamber, flow to the front of the heater, and return again to the smoke-box. It is evident that the gases are held in intimate contact with the heating surface, six times the length of the heater, before they are permitted to escape.

## High Ratio of Heating Surface to Grate Area

The radiator tubes are covered with extended surfaces, or fins, typical of those used on indirect heating coils. The long, oval tubes of the radiator provide an exceptionally large heating surface and, when combined with the surface of the combustion chamber, afford a remarkably high ratio of heating surface to grate area.

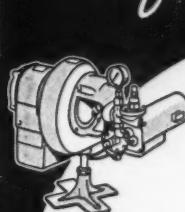
## Balanced Construction

The construction of the Acme Heater provides ample free area and allows proper velocity of the air to be heated. Moreover, this air is brought into direct contact with as much heating surface as possible, resulting in the Acme of Efficiency.

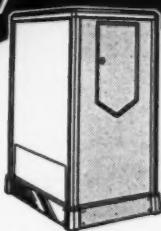
**ACME HEATING & VENTILATING CO., Inc.**  
4224 LOWE AVENUE CHICAGO, ILL.



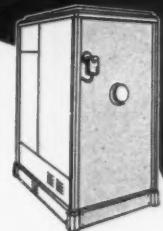
## AUTOMATIC HEATING and AIR CONDITIONING Equipment



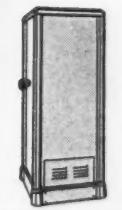
Oil Burners (8 sizes)



Boilers, Cast Iron, Steel (Oil, Gas, Stoker)



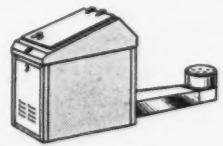
Air Conditioners (Oil, Gas, Stoker)



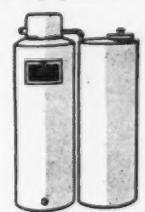
Water Heaters (Oil, Gas, Stoker)



Room Coolers and Central Cooling



Stokers (for soft or hard coal) (5 sizes)



Water Softeners (All sizes)



Basement Sprinkler Systems (A popular novelty that gets you into prospects' homes)

\* Your territory may be open for this popular line. Write today for literature and interesting dealer proposition.

**SCOTT - NEWCOMB, INC.**

1922 Pine Street, St. Louis, Missouri

**U.S.AircO**

**offers a Sensational  
New Cooling System  
at Amazingly Low Price—**



*Quickly  
installed in  
small space*

## *midget* **Kooler-aire**

A really efficient air conditioning system that YOU can sell and install in small stores, cafes, bars, beauty parlors, offices and other places where the comfort of customers is paramount.

Midget Kooler-Aire operates on the same basic principles and uses the same exclusive control devices as the larger Kooler-Aire systems in successful operation in thousands of theatres. It brings in 100% fresh air, washes out dust and dirt, cools it to the comfort point and circulates it gently throughout the establishment.

### **Business is WAITING for You**

Business people now know they must have comfortable air conditions in their establishments to meet competition and stay in business. Now you can identify yourself with an established and nationally-known air-conditioning organization. U. S. AircO builds systems for every air conditioning need—four types of equipment, plain air, washed air, cold-water and refrigeration. Right now you are facing your biggest opportunity to make BIG MONEY. Fill out and mail the coupon today.

-----  
UNITED STATES AIR CONDITIONING CORP.  
2105 Kennedy St. N. E., Minneapolis, Minn.  
Please send information on the Midget Kooler-Aire and other  
U. S. AircO Air Conditioning Systems and exclusive dealer franchise.

Name.....

Address.....

City..... State.....

### **Konzo Research Residence Facts**

(Continued from page 67)

tion increases very rapidly. The data given for a 60-degree angle indicates that the pressure loss is equal to an equivalent length of straight duct of approximately 22 diameters in length. An extrapolation of the data to an angle of 90 degrees would give a pressure loss equal to approximately 0.7 times the velocity pressure, or approximately 35 diameters of equivalent straight pipe. Additional data are necessary on the pressure losses incurred when angle connections are made, but the values given are indicative of the magnitude of this pressure loss.

TABLE 1  
Pressure Loss in Branch Connections  
Pressure Loss

Angle that branch makes with main duct	In terms of velocity pressure	In terms of equivalent length†
15 degrees	0.09 v.p.	4.5 diameters
30 " "	0.17 v.p.	8.5 " "
45 " "	0.22 v.p.	11.0 " "
60 " "	0.44 v.p.	22.0 " "

†Note.—Approximate value of equivalent length based on considering "one velocity head" lost in 50 diameters of straight pipe. This assumption was made by the writer and is not included in the original data.

7. The "loop" system, which is used by one company, is an important modification of the extended plenum duct system. In this modified method, an endless main trunk starts from one side of the bonnet, runs through the basement, and ends at the other side of the bonnet. The entire trunk system is in effect an extended plenum chamber. In case of unforeseen or unpredicted restrictions in one half of the "loop," the branch ducts are assisted by air supplied from the less restricted half of the "loop." Although no test data are available on the performance of this system, the discussion which has been presented should apply equally well to this modified method.

### **B. Overhead Duct System**

The forced-air heating system is particularly well adapted to residences and structures that do not have a basement, and in which the heating plant must be located on the ground floor, or in some cases even above the ground floor. Such structures, which are more common in the warmer sections of the country, offer many difficulties to all other types of central heating systems, but can be readily handled with the positive pressure type of system. A diagrammatic sketch of a forced-air heating system located on the ground floor of a residence is shown in Fig. 3.

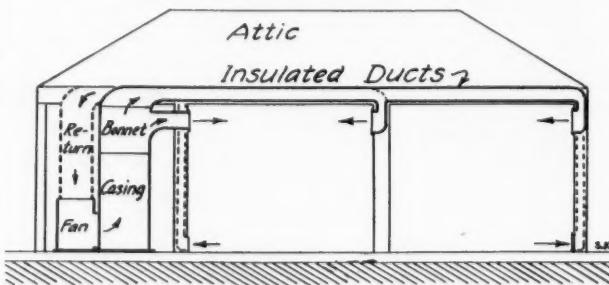


Fig. 3—Diagram showing overhead duct installation for one-story house.



Photo Courtesy Brunswick-Balke-Collender

**You Can Win with Cook Controls**

Win the customer's good will that paves the way to a larger, more profitable volume of sales—by selling Cook Controls for your forced air and gravity jobs.

The Cook No. 218 System and the Cook No. 12 Heat Control are simple to install, easy to handle, service-free in operation and will perform 100% for your customers.

Important mechanical superiorities make Cook Controls your customers' best buy—and give you exclusive, action-producing selling features. Ask us to prove it.

**COOK CONTROLS**

THERMOSTATS—FURNACE LIMIT CONTROLS  
ZONE CONTROLS — BLOWER CONTROLS

**COOK ELECTRIC COMPANY**  
2674 Southport Ave. CHICAGO

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**LOCHINVAR CORPORATION**

11921 GRAND RIVER AVENUE  
DETROIT, MICHIGAN

Dear Sir:

Please send complete information about  Model 100 Furnace  
 Model 100-A Furnace  Water Heater.

Firm Name \_\_\_\_\_

City \_\_\_\_\_

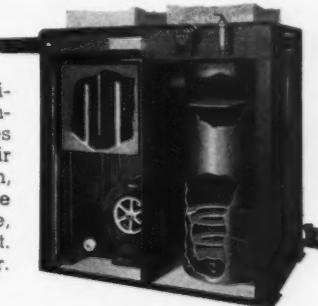
State \_\_\_\_\_



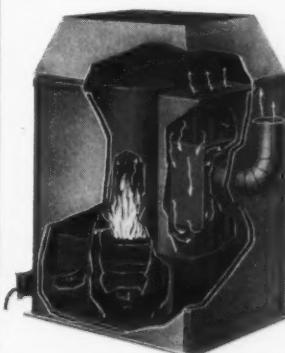
.. that will bring  
you good  
news about a  
fast selling *Line of*  
oil burning furnaces

Don't wait on this proposition—it means sales volume—profits—plenty of them. Use the coupon now.

The Lochinvar line of furnaces provides automatic oil heat at moderate cost. The Lochinvar burner—simple—without moving parts, motors, whirlers, blowers, etc., makes possible a high grade oil burning plant at about the cost of an equivalent coal furnace.

**MODEL 100 A**

A complete winter air conditioning plant, suitable for highest grade installations. Includes automatic humidification—air filtration—forced circulation, and automatic temperature control. Welded steel furnace, artistic baked enamel jacket. Brass and copper humidifier. A beautiful job.

**MODEL 100**

Costs about the same as a coal furnace, hence is an excellent replacer. Welded steel furnace—crackle finish jacket.

**Lochinvar Water Heater**

Provides plenty of hot water at low cost—1600 gallons per dollar of fuel, with oil at ordinary prices.

*Now—back to the top of this ad  
—and clip that coupon.*

**Lochinvar Corporation**  
11921 GRAND RIVER AVE., DETROIT, MICHIGAN

April, 1937

The furnace can be located in a special heater room which is adjacent to, or integral with, the main part of the house. The warm air ducts can be placed overhead and can be either of the trunk type or of the individual duct type. The supply ducts can then be led down through the studding space into high sidewall registers. The use of baseboard registers is hardly warranted in installations of this sort on account of the increased cost. Although ceiling type warm air registers might be used, the sidewall registers will probably prove more practicable on account of the cheaper installation costs and the fewer difficulties involved. The cold air return registers should be placed near the floor line and can be connected to ducts that lead up through the studding spaces. These individual return ducts can then be collected into trunk ducts that carry the air to the fan. Many houses being built without basements use concrete trenches of tile lines beneath the floor for return of air to the fan room.

#### Overhead System Characteristics

An inspection of the characteristics of this type of installation shows that certain features of the plant require special consideration. These may be enumerated as follows:

1. If the ducts are carried upwards into an unheated attic space, these ducts which are exposed to low air temperatures should be adequately protected to minimize the heat loss from the ducts. These ducts

should be wrapped or covered with insulating material at least one inch in thickness.

Although the necessity for covering cold air return ducts in the attic space is not as great as that for covering the warm air ducts, such insulation would be desirable particularly in view of the small expenditure required to obtain fairly substantial reductions in heat loss from the pipes.

2. Many right-angled turns in the duct system will be required to conduct the air from the furnace up into the attic space and down the studding space to the registers. The use of stream-lined fittings and elbows will serve to reduce the frictional resistance to the flow of air to a minimum value.

3. "In an overhead duct system installed in a two-story structure the chimney effect of the stacks to the second story room may be sufficient to keep the bonnet from overheating during the off-periods of the fan. However, in an overhead duct system installed in a one-story structure the chimney effect of the leaders is practically negligible.

Hence, in an overhead duct system with intermittent operation of the fan, very little "gravity" action can be expected during the off-periods of the fan. When the fan stops operating, the residual heat that is stored in the furnace and casing will tend to increase the temperature of the air in the casing.

In the ordinary basement furnace installation this reserve heat has some opportunity of escaping through

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for Live-Wire Dealers



Exclusive dealer franchise assures your future



Expert assistance with your selling, advertising, installation, and financing problems.

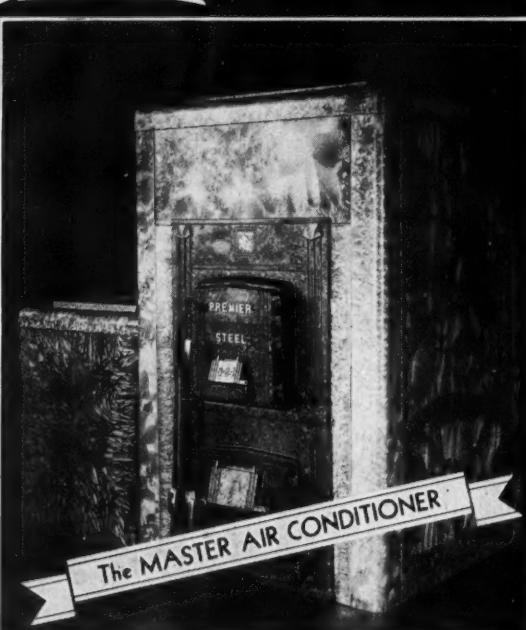


More than 66 models, backed by a 16-year reputation for good quality and fair dealing.



Frankly, you'll be a happy man when you become a PREMIER dealer. The PREMIER line is **complete**—no sales lost because you can't furnish the right equipment. PREMIER products are priced right—you'll be amazed at the values. Our 6% Time Payment Plan gives your customers a clean-cut, low interest agreement—and advances you ALL the money when the installation is made.

Last but best of all, we **really** give you co-operation. We will plan and estimate your air conditioning jobs **FREE**—furnish valuable sales and advertising helps. Yes! We have a **sweet proposition** for live-wire dealers. Write today for details.



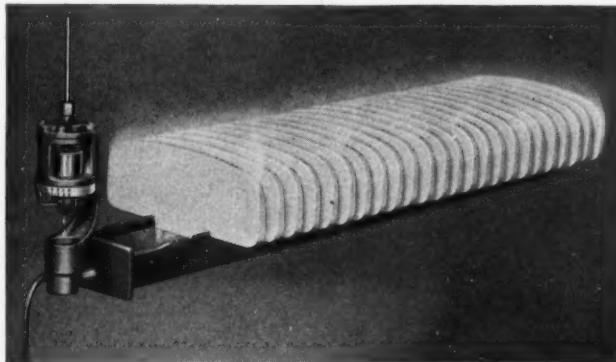
**The MASTER AIR CONDITIONER**

**6%**  
TIME PAYMENT  
PLAN . . . NO  
DEALER RESERVE

A complete "package" unit available with steel or cast iron furnace equipment. Genuine Premier Quality throughout and look at these sales impelling features—streamline cabinet . . . Rock-Wool insulation . . . quiet running Blower . . . automatic control . . . and, moderate price. Send for descriptive folder today.

**PREMIER FURNACE COMPANY**  
Manufacturers of Warm Air Heating and Air Conditioning Equipment  
DOWAGIAC MICHIGAN

# AUTOMATIC JUNE HYDRO-METRIC HUMIDIFYING SYSTEMS



Self contained Basement Type

## Get More than YOUR Share of this **\$2,000,000 BUSINESS**

In 1936, home owners bought more than \$2,000,000 worth of humidifiers. In 1937, this figure will be much bigger. Here is a growing market, and the sales of Automatic June are growing faster, much faster, than the industry.

Automatic June offers home owners all the advantages and none of the disabilities which have accompanied humidifying devices. It gives them everything they expect in a perfected humidifying system.

Automatic June provides ample humidification in mild weather, even in forced air systems where bonnet temperatures are low . . . In severe weather it limits evaporation, thus doing away with "weeping windows" . . . Extremely small area of evaporator does not impede air flow . . . Will not clog . . . No liming troubles . . . Easily installed . . . Trouble-free.

Automatic June presents you big profit possibilities. Write today for particulars.

**MONMOUTH PRODUCTS CO.**  
231 East 131st Street Cleveland, Ohio



## A COMPLETE LINE for Heating and Cooling

The Aerofin line of light-weight fan system, heating and cooling surface offers everything, that architects, engineers and heating contractors need. It embodies in its design, advanced features that anticipate problems met with under practical operating conditions. That is why it is the dependable choice of the leaders in air conditioning, heating and ventilating.

More Aerofin heat exchange surface is sold than any other type—more than 45,000,000 feet of it since Aerofin was first introduced. Forty-five million feet of experience is in the manufacture of Aerofin.

Investigate Aerofin — today. Send for descriptive literature. Our engineers offer you a technical service which will help you solve any problem. Take advantage of it. There is no obligation.

**AEROFIN CORPORATION**  
850 Frelinghuysen Avenue  
Newark, N.J.

Chicago • Detroit • New York • Philadelphia



April, 1937

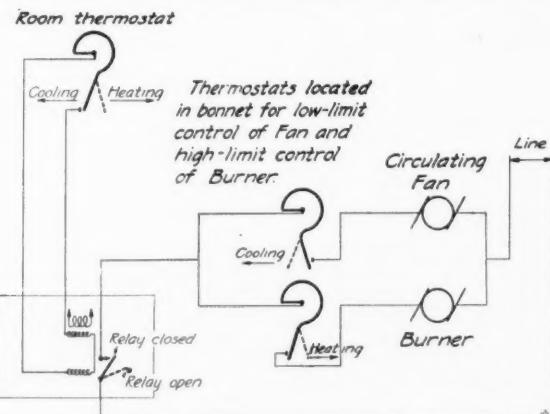
the stacks even when the fan stops operating. However, in the overhead duct system since the "gravity" action will be practically negligible, there is a possibility that the air temperature in the bonnet may rise to an undesirable value, particularly for solid-fuel, fired plants. In order to avoid excessive bonnet air temperatures in overhead duct installations the following type of control system may be found most applicable:

The room thermostat operates the drafts or burner, and the bonnet thermostat operates the fan. This arrangement will prevent temperature over-runs in the bonnet but will be accompanied by temperature over-runs in the rooms of the house. Such over-runs may not be very large for liquid or gaseous fuel plants, but may be excessive for plants fired with a rapidly responding solid fuel.

An alternate control arrangement that may prove more satisfactory for coal fired plants is that in which the operation of the furnace and the fan are controlled from the room thermostat as shown in Fig. 4. Two bonnet thermostats, which are placed in a parallel electrical circuit, are wired in series with the room thermostat so that when the bonnet air temperatures are low the fan does not operate and when the bonnet air temperatures are high, the furnace damper remains closed. With this arrangement warm air is delivered to the rooms only when the room thermostat demands heat, and when the room thermostat is satisfied both the fan and combustion process are stopped. As a precaution against overheating in the bonnet, an arrangement should be provided so that when the bonnet air temperature exceeds a predetermined upper

limit the fan will operate regardless of the temperature of the room at the time.

4. Since the heating unit will be in closer proximity to the living quarters of the house, the installation should be isolated in such a manner that sound and vibrations will not be transmitted from the equipment to the living quarters. The furnace room should be lined with fire-resistant, sound-absorbing insulation. In case



Simplified Wiring Diagram of Control for Forced-Air Heating.

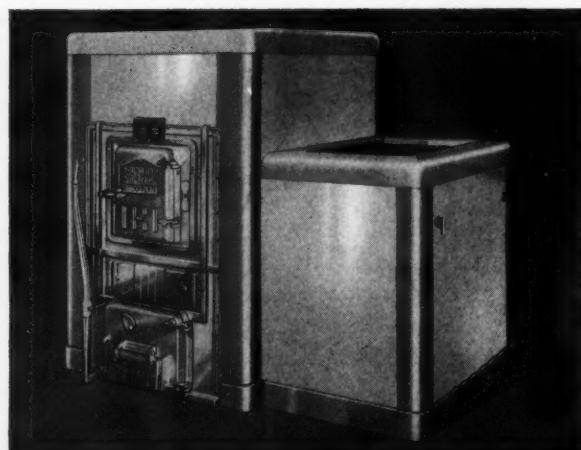
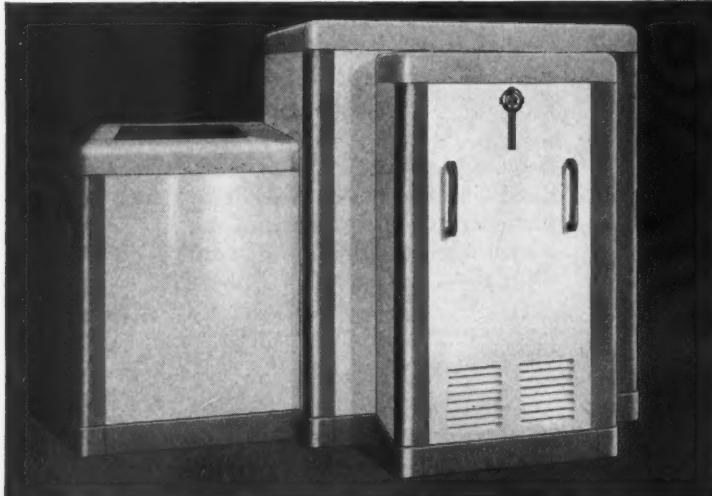
Fig. 4—Control hookup showing furnace and fan controlled from room thermostat with fan low limit and high limit damper and fan safety.

the furnace room is located in an exposed wing of the house, the room should also be adequately insulated. In some cases it may be necessary to place all moving

(Continued on page 86)



1937 Semi DeLuxe Oil Master "MX" Series. Casing vestibule offered in several sizes for completely enclosing any make of oil burner.



1937 Semi DeLuxe Boiler Plate "FX" Series designed for coal or wood. Optional for manual or automatic control.

Get the facts today about this new, expanded, improved line of heating and air conditioning equipment now being built by the "Round Oak Folks". Round Oak offers their dealers greater sales and profit potentialities during 1937.

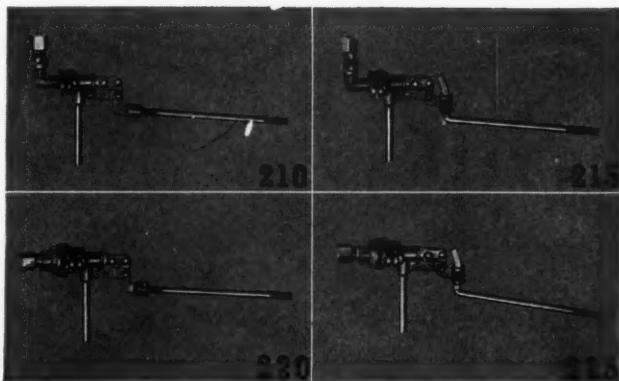
The trend of the times permits us to offer unusual, compact streamline designs constructed of a heavy gauge cold rolled steel, handsomely finished in two-tone high gloss enamel . . . completely new combinations of heating and air conditioning for automatic or manual control. A completely new oil burner of Round Oak engineering and design, manufactured by Round Oak.

Inquire at once for complete information about Round Oak products. Request the 1937 dealer proposition providing a valuable merchandising program.

**ROUND OAK COMPANY**  
Stoves - Ranges - Furnaces - Oil Burners - Air Conditioners  
DOWAGIAC, MICHIGAN

# M-VB

## HUMIDIFIER VALVES bring warm-air furnaces UP-TO-DATE



**No. 210** Installed through pan cover. Float position set.

**No. 220** Installed through side of pan. Float position set.

**No. 215** Installed through pan cover. Float position adjustable.

**No. 225** Installed through side of pan. Float position adjustable.



Deep Seat Washer

Here's an automatic humidifier valve that will get the most in efficiency and comfort out of any warm-air furnace. It comes in four numbers—one to fit any type of water - pan construction.

The entirely automatic operation maintains the correct water level at all times. Moving parts can't corrode or stick, because they are clear of the water. The valve plunger is heavily chromium plated, seating against a newly developed washer. This washer is so constructed as to permit its use under temperatures of from 300° to 350° F. without loss of resiliency and without disintegration resulting from a constant flow of water through the valve.

The study, experimenting and testing back of these humidifier valves are typical of M-VB thoroughness in developing an article worthy of the M-VB trade-mark. A letter to the address below will bring particulars without obligation.

## M-VB

**MORENCY-VAN BUREN DIVISION**  
*Scovill Manufacturing Company*  
**Sturgis Michigan**

A COMPLETE LINE OF CLOSET TANK FITTINGS

*Remove this  
Envelope*  
before starting a

**FURBLO**  
FURNACE BLOWER

FURBLO wants the user to get the 5 YEAR WARRANTY in writing—wants the dealer and installer to give it to each buyer as an assurance that the manufacturer is proud of his product and stands behind its quality and performance along with the man who sells and installs it.



\* The FURBLO 5 YEAR WARRANTY in writing is attached, in a sealed envelope, to the blower wheel.

FURBLO offers you, as the dealer, more and more each season. Each year FURBLO reduces your selling efforts, so you can sell more—so you can make more profit.

This year FURBLO models give you "styling"—"Eye appeal"—give you "Top Mounted Motors" for more efficient, quieter, safer and uninterrupted operation—give you a new type blower and multi-speed pulleys . . . All features that make performance better, more certain and make selling easier.

But FURBLO goes still further and gives to the final purchaser and the user a 5 YEAR WARRANTY in writing as his or her "satisfaction insurance".

FURBLO charges onward with an ear to the ground and an eye on the future, ever mindful that the dealer must sell satisfaction, if the industry is to grow.

Surely you can see the importance of lining up with a leader—a pioneer. Then write today for particulars, literature and prices. Or, if you prefer, ask your heating jobber or distributor. But by all means, ACT NOW—TODAY.



**ENROLL**

**FURBLO INSTITUTE**  
AIR CONDITIONING  
SALES AND ENGINEERING  
SCHOOL OF THE MAILED.  
NO TUITION — NO FEES.

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HERMANSVILLE MICHIGAN

April, 1937

## Cooling in Research Residence

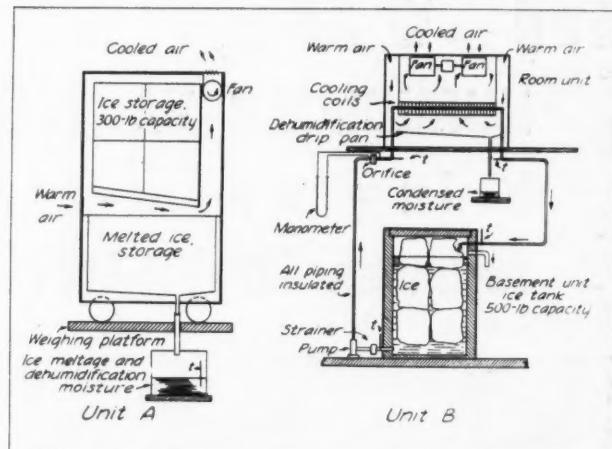
(Continued from page 57)

The arrangement for cooling with outdoor air at night was practically the same as that shown in Fig. 3 and previously described under the mechanical refrigerating plant. The quantity of air delivered under these conditions of operation was approximately 2,300 cu. ft. of air per minute, which was equivalent to 9.7 air changes per hour.

### Attic Fan Cooling With Night Air

In addition to the facilities provided for cooling with outdoor air at night by means of the fan in the main air circulating system, during one cooling season, an attic fan shown in Fig. 4 was installed in the doorway at the head of the stair leading from the second to the third story. This 24-inch propeller-type fan delivered air from the first and second stories into the third story or attic space whence it escaped through the windows on all sides. The use of a special duct and damper arrangement on the suction side of the fan, as shown in Fig. 4, permitted outdoor air to be drawn into the open first and second story windows at night, or to be drawn through a duct from a third story window in order to provide positive ventilation for the third story during the day. Under both arrangements the fan delivered approximately 4,000 cu. ft. of air per minute, which, in terms of the space on the first and second stories, was

equivalent to approximately 17 air changes per hour. Based on the space on the second story the delivery was equivalent to about 34 air changes per hour.



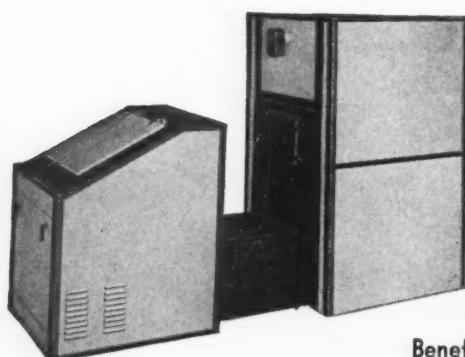
*Diagram of Cooling Units and Test Arrangement.*

Fig. 5. Diagram of cooling units and test arrangement.

### Unit Room Coolers

The unit room coolers and the arrangements for testing them are shown in Fig. 5, and both units were located in the living room on the first floor of the Research Residence on the north wall. Unit A was a portable insulated ice chest, consisting of two compartments, one located above the other. The upper compartment was for ice storage, with a maximum capacity of 300 lb.

## DOUBLE YOUR SPRING PROFITS WITH THE HESS AIR CONDITIONING STOKER FURNACE



Dealers, make your spring season for cleaning and repairing furnaces bring you orders for complete automatic coal heating. Automatic coal stokers are fast gaining favor with home owners, so double your sales and profits by including a stoker with the new furnace sale.

### SELL A COMPLETE HEATING SERVICE

The Hess line includes a complete range of sizes of Hess and Benefactor welded steel furnaces, also Blower Filter Units to give complete winter air conditioning with summer benefits.

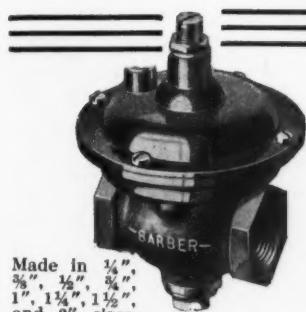
WRITE TODAY FOR DEALER PORTFOLIO OF ENTIRE HESS LINE  
EXCLUSIVE TERRITORY SELLING PLAN GIVES GREAT ADVANTAGES

**HESS WARMING & VENTILATING CO.**

FOUNDED 1873

1211 S. WESTERN AVE.

CHICAGO, ILL.



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 $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{5}{8}$ ",  
 $1"$ ,  $1\frac{1}{4}"$ ,  $1\frac{1}{2}"$ ,  
and  $2"$  sizes.

*The word for*  
**Quality**  
*in a*  
**Gas Pressure  
REGULATOR**

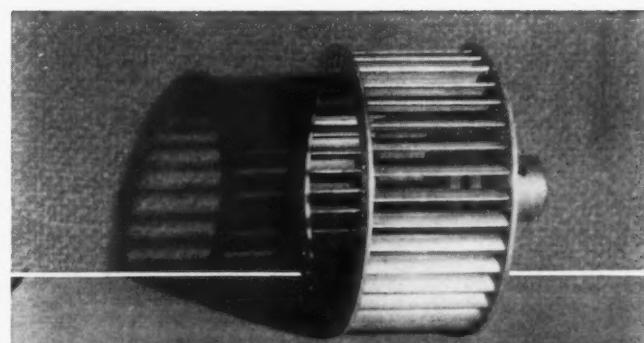
## is "BARBER"

EVEN if it cost twice as much, there would still be good value in a Barber Regulator. Built to exacting standards of precision, it has the responsiveness and accuracy of operation that are beyond price. Gas-tested for operation within three-tenths pressure drop and rigidly inspected. Approved by A. G. A. Neat and compact design, all-bronze bodies, a quality product in every detail. Yet Barber Regulators are sensibly priced!

Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

**THE BARBER GAS BURNER CO.**  
3704 Superior Avenue • Cleveland, Ohio

The Barber Gas Burner Co. of Michigan  
4475 Cass Avenue, Detroit, Michigan



## BLOWER WHEELS

### Precision Standards Applied to Quantity Production

For furnace manufacturers who buy wheels only, Clarge offers any size desired, and can meet any quantity requirement. Clarge Wheels can be furnished standard width, or any percentage of standard width to deliver a specified volume of air at any operating speed. All wheels are PERFECTLY BALANCED for quiet operation without vibration.



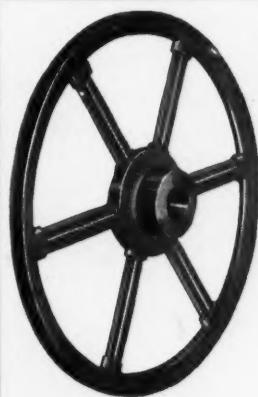
COMPLETE ASSEMBLIES

Clarge Furnace Fans (complete assemblies) combine many advantages. They are positive centrifugal type, very compact, highly efficient, and the low speeds insure SILENT OPERATION.

Write for complete information and price schedules.



CLARGE FAN COMPANY • Kalamazoo, Mich.  
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



## PULLEYS DESIGNED for AIR CONDITIONING

True Running  
Rugged Construction  
Smooth-Finished Grooves  
Quiet, Smooth Operation

Diamond Bored . . . . . Balanced . . . . .

### IMMEDIATE DELIVERY

Fits the Belt . . . . . Gray Finish  
1 $\frac{1}{2}$ " O.D. to 14" O.D. Also four sizes  
of . . . . .

### VARIABLE SPEED PULLEYS

Sample pulleys available for tests—bore size and diameter necessary.

**CONGRESS TOOL & DIE COMPANY**  
9034 Lumpkin Avenue  
DETROIT, MICHIGAN, U.S.A.



The tremendous swing toward A-P Controls is a reflection of their incomparable reliability.

By their application to modern humidifying and air conditioning units, A-P Solenoid Valves eliminate the common hazards of leakage, corrosion and obstruction of fluid flow.

Available for water, refrigerants or oil—and a size for every job.

Write for Bulletin Number 410 for detailed description and specifications.



**AUTOMATIC PRODUCTS COMPANY**

2452 NORTH THIRTY - SECOND STREET

MILWAUKEE



WISCONSIN

April, 1937

**THE PUBLIC DEMANDS QUALITY!**

CHALMERS HAS IT

17 YEARS of active experience! Used widely in America, Europe, Asia and Africa. Carries Underwriters and New York City approval. Used by the U.S. Government. Adapted to Boiler-Burner and Furnace Units. New literature available for interested dealers — Write today.

MEMBER  
**OBI**  
OIL BURNER INSTITUTE

USE YOUR LETTERHEAD, IT STIMULATES US!

CHALMERS OIL BURNER CO. 1251 Central Avenue MINNEAPOLIS, MINN.

Use

**MERCOID CONTROLS**

THEY GIVE ACCURATE AND DEPENDABLE SERVICE OVER A LONG PERIOD OF YEARS

**MERCOID FAN AND BLOWER CONTROL**

Used extensively throughout the warm air heating trade. There are many outstanding features on this control that are desirable

See catalog for complete list of Mercoid Controls

THE MERCOID CORPORATION - 4201 BELMONT AVE., CHICAGO, ILLINOIS  
Please send Catalog No. 100-T

Name \_\_\_\_\_  
Address \_\_\_\_\_

of ice, while the lower compartment formed a tank for collecting the meltage and moisture condensed from the air. A fan circulated the room air through the unit.

Unit B included an insulated ice storage tank of 500 lb. capacity, located in the basement, and a cooling unit consisting of an attractively finished cabinet enclosing an extended surface cooling coil, fan, and dehumidification drip pan. The chilled water from the storage tank in the basement was pumped through the cooling coil, over which warm air from the room was circulated by means of a fan.

The operation of both units was controlled by a room thermostat which served to start and stop the circulating fans, in accordance with the cooling requirements necessary for maintaining a constant air temperature.

During the summers, from June to October, very complete records were made of the indoor and outdoor air conditions by means of temperature recorders, thermometers, thermocouples, and psychrometers, and many incidental observations were made from time to time. During the periods requiring cooling, detailed records of the operation of the plants, including water and electrical power consumption, and the cooling load, were made at regular intervals both day and night.

[To be continued]

## Konzo-Research Residence Facts

(Continued from page 82)

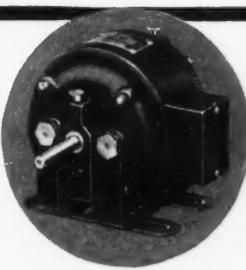
machinery and motors on separate foundations that are not integrally connected with the main flooring of the structure.

5. In very small, single story structures in which a central hallway connects all of the rooms of the house, it has been suggested that the return air ducts be omitted and all of the return air be allowed to return from the rooms into the hallway and then into a return grille placed near the floor level on one or more sides of the furnace room. Such cheap systems may be satisfactory for the extremely small homes located in mild climates, but may prove to be somewhat drafty in most cases and should not be used in the better types of installations.

6. Some unusual installations in which the heating unit is located in the attic or in which the main, warm air trunk is layed in an underground trench have been reported. These unique installations tend to show the adaptability of the forced-air heating system to adverse conditions of installation, but are not sufficiently important to require special consideration.

[To be concluded in next issue with discussion on part C, "High Velocity Duct Systems."]

## "Silence is Golden"



Sales come to the dealer who can promise quiet operation of the air conditioning system he sells. For him, "silence is golden."

That is why, more and more, you will find Ohio Motors standard equipment on air conditioning systems. Ohio Motors have a proved record of quietness.

If the air conditioner you sell is equipped with an Ohio Motor, you, too, will discover how "silence is golden" when you promise your prospects quietness of operation.



## OHIO MOTORS

THE  
**OHIO ELECTRIC  
MANUFACTURING CO.**  
5910 Maurice Ave.,  
Cleveland, Ohio



## GRILLES and REGISTERS

## DESIGNED FOR AIR CONDITIONING *Engineered Air Distribution Outlets*

- UNI-FLO Grilles and Registers permit the use of higher air velocities than ordinary outlets.
- They also allow the use of greater air temperature differentials. These two factors reduce the size and number of ducts and outlets.
- The air stream is highly diffused, due to the exclusive UNI-FLO fin design.
- Directional fin arrangements can be pre-planned for correct air distribution.

*Send  
for  
Data*

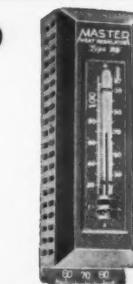
BARBER-COLMAN COMPANY • ROCKFORD, ILL.

**Only \$13.50  
to dealer**

**Type B-22  
Two-Position**

**genuine**

## MASTER HEAT REGULATOR



The big estate on River Drive couldn't get a better regulator than a "MASTER"—and here's a "MASTER" priced within the reach of any home owner. Accurate, noiseless, responsive to changes of 1 degree, easy to install and longer-lived than the heating plant. Listed as standard by Underwriters Laboratories. A real business-getter for you.

Made by the manufacturers of the famous Type B-144 the Original Gradual Control Heat Regulator.



**WHITE MANUFACTURING CO.**  
2362 University Ave.  
St. Paul, Minn.

HERE IS A THOROBRED  
**PACEMAKER**  
IN THE  
FASTEST GROWING,  
BIG PROFIT FIELD...

THE **AUTOMATIC BUTLER** COAL  
STOKER  
CONTINUES 400% SALES INCREASE PACE

Last year stoker sales increased 81%. Compare that to increases of 39% for oil burners and 28% for mechanical refrigerators. Consider well too the fact that last year sales of The AUTOMATIC BUTLER Coal Stoker were up nearly 400% over 1935.

Get into this fastest growing of all business fields NOW. Get into it with the PACEMAKER, the MONEY MAKER, The AUTOMATIC BUTLER.

The line is complete. All models and sizes from 18 lb. per hr. to 1000 lb. per hr. capacities are highly engineered to handle a wider range of Automatic Heating at its best. Thousands are in use setting sales building performance records.

Automatic Butler dealer franchises are going fast. To see why check the advantages NOW before too late.



14 SIZES  
STANDARD STREAMLINED



SELF-COALING  
BIN-TO-BURNER



AND  
COMMERCIAL  
MODELS

*For complete data write direct to Stoker Division*

**BUTLER MANUFACTURING COMPANY**  
1273 EASTERN AVE., KANSAS CITY, MO.



## PICTURE OF A MAN

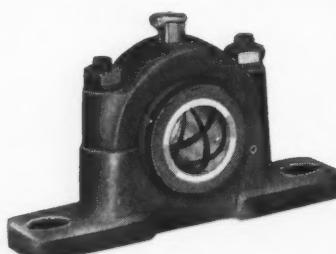
who is making money hand-over-fist selling the new Skuttle Direct-Fired Humidifier . . . the industry's first practical solution to the problem of humidifying radiator-heated homes. If you have not yet written for complete information on this new money-maker, do so today! It's 1937's hottest news in the home humidification field. Address your request for descriptive literature to:

THE J. L. SKUTTLE COMPANY  
4290 W. Fort Street, Detroit, Michigan

**Skuttle**  
AUTOMATIC HUMIDIFIERS



Cut-away section  
of ball of Randall  
Standard Pillow  
Block



Randall Standard Pillow Block  
assembled. (Patented)

## BEARINGS THAT STAY YOUNG IN SERVICE

When most bearings are worn out, Randall Bearings are still giving dependable, QUIET, smooth service.

The Randall Standard Pillow Block, shown here, is the fastest selling item of its type on the market. It is self-lubricating, self-aligning and operates with minimum running torque.

Blowers equipped with Randall Bearings deliver air throughout the system WITHOUT METALLIC BEARING NOISE.

Write for our new catalog, or outline any special bearing problems you have.

**Randall GRAPHITE PRODUCTS CORP.**  
Dept. 411 609 W. Lake St., Chicago, Ill.

## Sinus and Cold Bedrooms

**D**O NOT sleep in a freezing cold bedroom or porch in the mistaken idea that you are building robust health thereby. This warning is particularly timely if you are one of the several million people who are now expecting the seasonal recurrence of sinus trouble.

Sinus trouble is another example of an old ailment with a new name. A generation ago people knew it as "catarrh." As medical attention became focused on this species of infection, the name gradually metamorphosed from the vague and mysterious "catarrh" into the simpler "sinus trouble," indicating its location.

Due to its close association with the common cold, which is its usual forerunner and source, sufferers from sinus trouble were often advised to use the same fadish treatments which were fashionable a decade or so ago as builders of resistance to the common cold. Chief among these measures, which have since given way to more conservative and rational treatment, was sleeping out on sleeping porches or with all windows wide open through the most frigid winter weather.

Today, prevailing medical opinion is against subjecting the body to extremes in temperature, except when properly dressed and physically active. Especially is this caution important when one is sleeping, as the circulation is then at its slowest, and even though the body might be warmly covered the exposed nasal passages are poorly protected against the bitter cold. One of the functions of the nose is to make the inhaled air body temperature immediately. Therefore, you are calling upon your nose to do an unnecessary amount of work while sleeping, and when the inhaled air is not properly warmed it causes a definite sinus irritation.

Conservative treatment is now recommended to sinus sufferers, based on good food, plenty of sleep, and general constitutional measures. Outdoor exercise when you are properly clothed is beneficial throughout the winter, and has a stimulating effect upon the mucous membranes and keeps them in good healthy condition. Such general constitutional measures have been found to be of more importance than the local measures usually applied.

Air conditioning of homes and offices is probably one of the best modern defenses against sinus trouble. A bedroom temperature of 68 degrees with proper humidity is cool enough for health.

The relationship of food and dust allergies to sinus disease is at present under investigation. In general, the elimination from the diet of any items of food to which the patient is known to be sensitive, is advisable.

A more restful sleep is obtained when the body is not subjected to extreme changes in temperature at night. An ounce of prevention is still worth a pound of cure. Colds and sinus trouble are highly contagious, therefore avoid as much as possible associating with people with colds, as sinus infections usually originate in the common cold. Second, stay away from poorly ventilated and smoke-filled rooms. Third, see your doctor regularly for health examinations.

**QUALITY and NU-WAY**

**QUALITY**—Is composed of many factors that are difficult to visualize.

In an oil burner—it first calls for knowledge—then wisdom—these are developed through experience—and they dictate the requirements of good materials.

Knowledge — Wisdom — Experience — Good Materials . . . are but factors . . . without sincerity of purpose—honesty and a determination to stay behind the product throughout its lifetime service—they remain loose ends.

Sincerity—Honesty—and responsibility knit the other factors into a **QUALITY** which means to the buyer—owner satisfaction.

It is this character of **QUALITY** which creates real value.

BUT—one thing remains—a **RESPONSIBLE DEALER** . . . are you that dealer in your community? If so, write today for the Nu-Way "Genii" proposition.

THE NU-WAY CORPORATION

Rock Island, Ill.

# MOTORS

for Direct Drive and Belt Drive Blowers

• Two speed, capacitor start, induction run motors for belt drive—ratings of  $1/6$ ;  $1/4$ ;  $1/3$ ;  $1/2$  horsepower. 1750 r. p. m. on high and either 1150 or 850 r. p. m. on low speed. A motor that makes possible two speed automatic control for belted blowers.



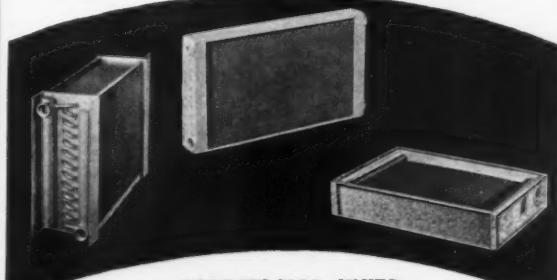
Also double shaft extended, single and variable speed totally enclosed, resilient mounted motors for direct connected fans and blowers.

Write for Bulletin 211

THE *Peerless* ELECTRIC CO.  
WARREN, OHIO

# YOUNG

## COILS for HEATING-COOLING-AIR CONDITIONING



For years Young heat exchange surfaces have established a standard of quality. Engineers and Heating Contractors can select a unit from the Young line to meet exact specifications with the utmost confidence of its proven performance. Each unit is light weight, compactly designed and properly tested under actual operating conditions to do a definite heating or cooling job. Write for descriptive literature.

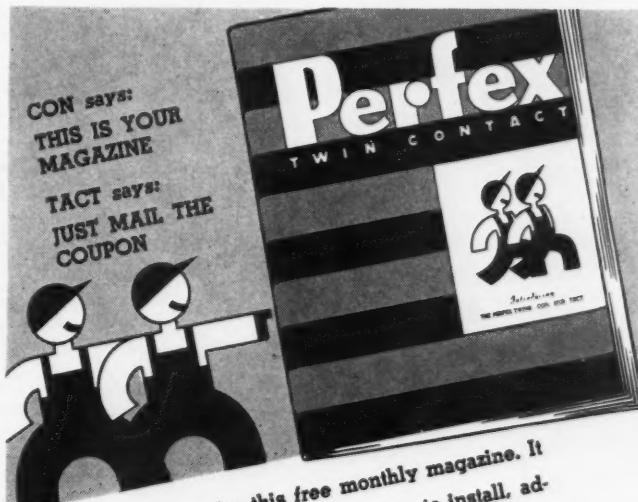
OFFICES IN ALL PRINCIPAL CITIES

## YOUNG RADIATOR Company

RACINE, WIS.



TRADE MARK REG.



Send the coupon for this free monthly magazine. It contains practical suggestions on how to install, adjust, and service automatic controls. In addition, it will give you late developments in the control field.

PERFEX CONTROLS COMPANY  
415 W. OKLAHOMA PLACE MILWAUKEE, WISCONSIN

Service Man    Dealer    Jobber    Manufacturer

Name.....

Firm.....

Address.....

CITY..... STATE.....

April, 1937

## New Literature . . .

For your convenience in obtaining copies of new literature, use the coupon on page 108.

### 131—For the Estimator

General Blower Company, a division of Air Conditioning Products Corp., of Pennsylvania, 2402 Market Street, Philadelphia, is distributing a 4-page folder for the estimator entitled "How to Determine the Right Type G-B-C 'Automatic Fire-Tender' (Mechanical Draft) to fulfill the Individual Requirements of any Installation."

### 132—Introduce New House Organ

Perfex Controls Company, 415 West Oklahoma Place, Milwaukee, is distributing "Perfex Twin Contact," introducing the Perfex Twins, "Con" and "Tact" who will edit the magazine each month.

This company makes thermostats, limit controls, oil burner and stoker combustion controls, relays and solenoid valves.

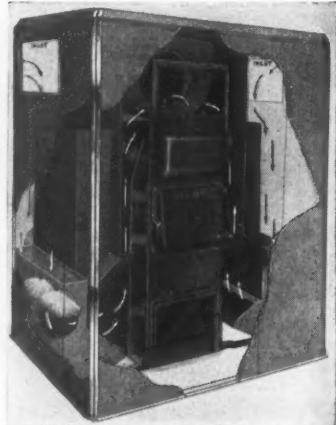
### 133—Odor Adsorbers

Consolidated Air Conditioning Corp., 114 East 32nd Street, New York City, claims that room air recirculated through Consolidated activated cocoanut shell carbon Odor Adsorbers is 100 per cent odor free and the best known substitute for outside air. Tables included indicate the excess cooling and heating loads required for fresh air admitted over room air recirculated.

This company is distributing a brochure entitled "Consolidated Odor Adsorbers in Air Conditioning."

### 134—Fan and Blower Shutters

Elgo Shutter and Manufacturing Company, 634 West



## THREE IMPORTANT POINTS TO YOUR SUCCESS IN THE FIELD OF AIR-CONDITIONING—

### 1 THE UNIT

Air-conditioning units embody entirely new principles in furnace construction . . . special metals, more compact design and precision controls. Today's buyers demand the performance that is possible only through these tried and proven engineering developments. Dallaire is the only unit available using Stainless Steel Combustion chamber.

### 2 THE INSTALLATION

Installation can make or break a system. Sound engineering alone can solve the problem of "tailor made" requirements presented by each installation. Dealer training is vital and should be supplied by the manufacturer.

### 3 PUBLIC EDUCATION

A misled public will only retard the progress of air-conditioning. Its advantages must be truthfully stated and a system installed that will bring back these claims to the letter. Anything short of this will only bring future grief.

**Dallaire**  
**EMPHASIZES**  
**ALL**  
**THREE**

1050 MAIN STREET DAIL STEEL PRODUCTS COMPANY, LANSING, MICH.

### No "Call Backs"



### When You Install THERMO-DRIP

• It's a wonderful feeling—to be sure the humidifier you install is going to work perfectly . . . and that your profit won't be eaten by expensive service calls! • THERMO-DRIP is the one humidifier you can install quickly . . . adjust easily to the conditions under which it is to operate . . . and then forget completely.

• There are no gadgets or gimmicks on this humidifier to bring repeated calls for adjusting and servicing. • It operates without electrical or mechanical devices—that also eliminates service demands. • Get all the facts about the profit-protecting THERMO-DRIP . . . today.

**AUTOMATIC HUMIDIFIER CO.**  
18th and Main Streets CEDAR FALLS, IOWA

## Now Ready— the New PEERLESS CLEANAIRE BLOWER

Everything you want in a soundly-engineered blower, including price. Write at once for full details.

PEERLESS FOUNDRY CO., 1851 Ludlow Ave.  
INDIANAPOLIS, INDIANA

Warren, Detroit, Michigan, is distributing a folder, with space for dealer imprint, covering the Elgo automatic shutters for the protection of exhaust fans and blowers.

The shutters close by gravity when the fan or blower is not in use and protect them from deterioration caused by rain or snow, and also serve as a protection against cold or insects entering a building. A selection of material is offered to meet requirements.

The company also makes back draft dampers, similar in design to the automatic shutters, except that the frame is made of band iron. These back draft dampers are frequently employed in ducts leading from a central air conditioning plant in hospitals, colleges, schools and other large buildings to maintain an even temperature by preventing any back pressure or drafts caused when the plant is not operating.

### 135—Control Through Outdoor Temperature

Marsh Tritrol Company, 720 North Michigan Ave., Chicago, is distributing a 12-page catalog illustrating and describing the Marsh Tritrol regulator, suitable for controlling all types of heating systems—steam, vapor, vacuum, hot water or warm air systems. The electrical contacts established are transmitted through a relay to the heating equipment. The circuit may start and stop an oil burner, stoker or gas burner, or it may energize a motor or solenoid valve. A pilot light indicates the operation.

With the Marsh Tritrol regulator, the controlling thermostat is outdoors and anticipates, they say, every change in the weather, and regulates the heat delivered to the building according to the requirements. Its program feature enables it to maintain a sub-normal temperature during the hours when full heating is not required and to regulate the time that normal heating is resumed in the morning, varying this also in accordance with outside weather requirements.

In the Service Man's Corner, will be brief-and-to-the-point articles on control problems, and applications will be discussed.

## New Literature . . .

For your convenience in obtaining copies of new literature, use the coupon on page 108.

### 136—Humidity in House Heating

The Dominion Fuel Board, Motor Building, Ottawa, Ontario, Canada, of which F. G. Neate is secretary, has published "Humidity in House Heating—the Cause and Control of Air Dryness in House Heating," for which they make a small charge.

### 137—Story of Penn Electric Switch

Penn Electric Switch Co., E. 20th & Walnut, Des Moines, Iowa, is distributing a 28-page booklet entitled "Land of Goshen," with a history of the company, its growth, and the recently built plant at Goshen, Indiana, to provide rapid shipments and to facilitate executive contacts with their customers.

### 138—Oil and Gas Conditioners

The Rudy Furnace Company, Dowagiac, Michigan, is distributing two new 8-page circulars—one illustrating and describing the oil heat air conditioner and the other the gas heat air conditioner. Both units heat, clean, humidify and circulate the air, or cool by ventilation in summer. Positive dehumidification and mechanical cooling may be added to both installations. Both circulars illustrate and describe the self-balancing loop system of installation, to which all rights are reserved.

### 139—Precision-Built Blower Wheels

Janette Manufacturing Company, 556 West Monroe Street, Chicago, makers of "Precision Built" electrical apparatus is distributing a four-page circular on their Janette blower wheels, claimed to incorporate some distinctive features for oil burners, coal stokers, gas burners, motorized blowers and air conditioning equipment.

The blades are die formed in pairs, except on double inlet type of wheels 7 in. in diameter and larger, and each blade is located at exactly the same angle. All wheels are given a rust resisting, baked aluminum finish.

### 140—Testing and Designing Service

Furblo Company, Hermansville, Michigan, announces in a 4-page folder laboratory testing and designing service for furnace manufacturers entering the air conditioning field in charge of Platte Overton, a recognized authority on heating and air conditioning.

A complete consultant service is offered for testing, rating, and the design of housings, hoods, and specially built blowers for various complete air-conditioning units. Equipment may be sent to the Furblo laboratory for testing, designing or other operations, or the work may be done at the furnace manufacturer's plant.

Results of tests are tabulated on special forms.

### 141—Filter—Humidity—Ventilate

Kleenaire Corporation, Stevens Point, Wis., is distributing three new pieces of literature.

"Health Assurance for Your Home" is an envelope stuffer setting forth the values of Kleenaire automatic constant level humidifier.

"Kleenaire (ball bearing) Rotary Turbine Exhaust Ventilator is described in an envelope stuffer. These ventilators are adapted for use on factories, hospitals, schools, churches, garages, restaurants, stores, residences and theatres.

"Kleenaire Type D, High Efficiency Air Filter, is described in Bulletin No. 135. This is a permanent filter, said to be impervious to water, easy to clean, removable and inexpensive, and is intended for general ventilating systems of all types.

## For STOKERS and BLOWERS!

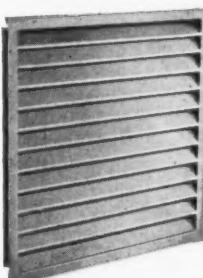
You'll find MAUREY Steel V-Pulleys designed and built for severest use in stokers and blowers.

Made for both "A" and "B" belts in all practical sizes, with heavy rolled edges and solid steel or malleable iron hubs. No DIE CAST HUBS are used in MAUREY Pulleys.

[ The MAUREY Variable Pitch Diameter Pulley permits a speed variation of as much as 30%. New construction—**SOLID STEEL**. Made in 4 sizes, 3 1/4" to 4 1/2" O. D. Write for literature. ]



**MAUREY MANUFACTURING CORP.**  
Wabash at 29th CHICAGO



## ELCON TYPE AUTOMATIC SHUTTERS

The Elcon type, all steel stationary shutter is welded into one rigid unit, and designed for intake or exhaust of air where an automatic exhaust shutter is not suitable.

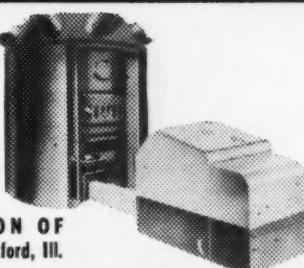
ELCON stationary shutters are built to any size, square or rectangular with louvers (Blades) at an angle of 45 degrees that prevents birds, leaves and other matter from entering the building. Write for further information.

**ELGO SHUTTER & MFG. CO.**  
DETROIT :: MICHIGAN

## ECONOCOL

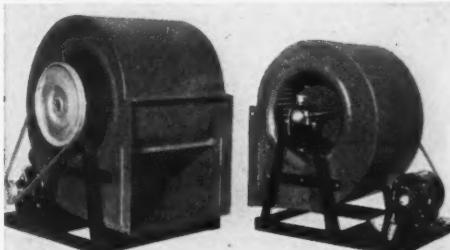
Join the nation's fastest growing industry by lining up with ECONOCOL. It's the leader in performance, low upkeep, appearance, and value. Write today for details on profitable, exclusive dealer franchise.

**ECONOCOL STOKER DIVISION OF COTTA TRANSMISSION CORP.**, Rockford, Ill.



## STOKERS

### ★ ★ ★ ARTCRAFT ★ ★ ★ HEAVY DUTY DOMESTIC BLOWERS



**DEALERS: "BUY THE BEST"**

**CHICAGO STEEL FURNACE CO.**, BLOWER DIVISION  
7934 So. Chicago Ave. Chicago, Illinois

**AN ALL PURPOSE AIR VELOCITY METER**

ALNOR VELOMETER

**Instantaneous-Direct Reading  
No Timing  
No Calculations  
Write for Folder**

ILLINOIS TESTING LABORATORIES, INC.  
412 No. La Salle St. Chicago, Illinois

**SUPREME HUMIDIFIERS**

**Spray Type—Electrically Controlled  
For Warm Air Furnaces**

**Increase Comfort and Fuel Economy by  
Effective and Controlled Humidity**

**Air Conditioning Controls—Electric Valves  
Spray Nozzles**  
Send for Circulars

**SUPREME ELECTRIC PRODUCTS CORP.**  
103 Mt. Hope Ave. Rochester, N. Y.

**Air Conditioning**

—What happens between two rooms, one having a six minute air change, and the adjoining room a twelve minute air change?

—Can you install a thermostat control system properly?

The answers to these and hundreds of other mechanical questions about air conditioning are appearing in the monthly *Air Conditioning Section* of AMERICAN ARTISAN.

If you do not now get the ARTISAN, send us \$2 and we will enter your subscription for a full year—12 consecutive issues. Your subscription will yield a rich harvest of money making ideas and solutions to many mechanical problems connected with warm air heating and sheet metal contracting.

**AMERICAN ARTISAN**  
6 North Michigan Ave. Chicago, Ill.

**STURDY—POSITIVE****GLEASON-AVERY  
FAN SWITCHES**

Reliable performance is built into every GLEASON-AVERY product as a matter of principle. Sturdy in construction and positive in operation they offer a perfect solution for overheating bonnets . . . in addition to controlling the fan in forced warm air systems.

Write us now for literature and prices.

**GLEASON-AVERY, INC.**  
AUBURN NEW YORK

**With The Manufacturers . . .****Sells Air Conditioning on Behalf of Industry**

Minneapolis-Honeywell, finding considerable confusion in the minds of the public in regard to the meaning of the term Air Conditioning, has devoted its entire spring advertising campaign towards selling air conditioning to the public on behalf of the industry.

**Fox Air Conditioning School**

The Fox Furnace Company of Elyria, Ohio, initiated its fourth year of engineering schools for its distributing organization on February 8.

This first school, conducted in Chicago, was attended by 175 distributors from Pennsylvania west to California and British Columbia.

Classes were in session for five days. Part of the time was devoted to the discussion of the engineering problems encountered in calculating requirements and designing an air conditioning system for a typical residence, building plans for which were provided. The discussion was based on the instructions given in the 1937 edition of the Sunbeam Air Conditioning Engineering Manual.

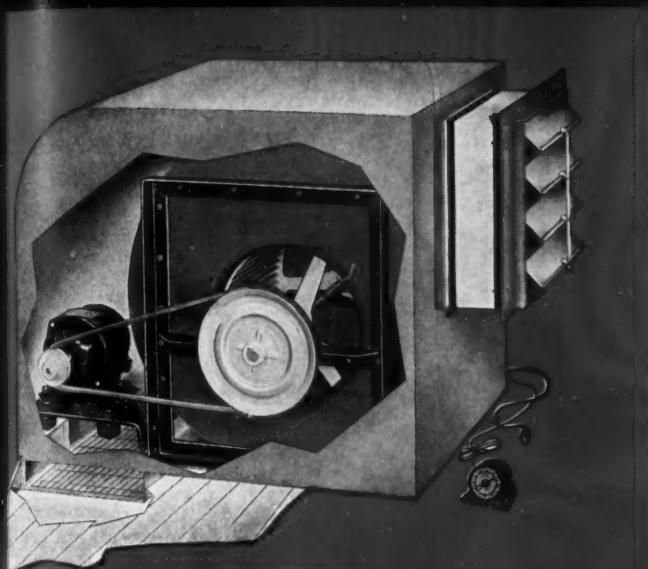
The balance of the time was given to lectures and demonstrations, by recognized experts, on summer cooling, oil burners, gas burners, humidifiers, controls, blowers and motors.

Similar schools were held in Atlanta, Ga., March 1st to 5th, and in New York City, March 15 to 19.

Following these schools the distributors' heating specialists will conduct local schools for their local dealers.

*Summer  
Sufferers*

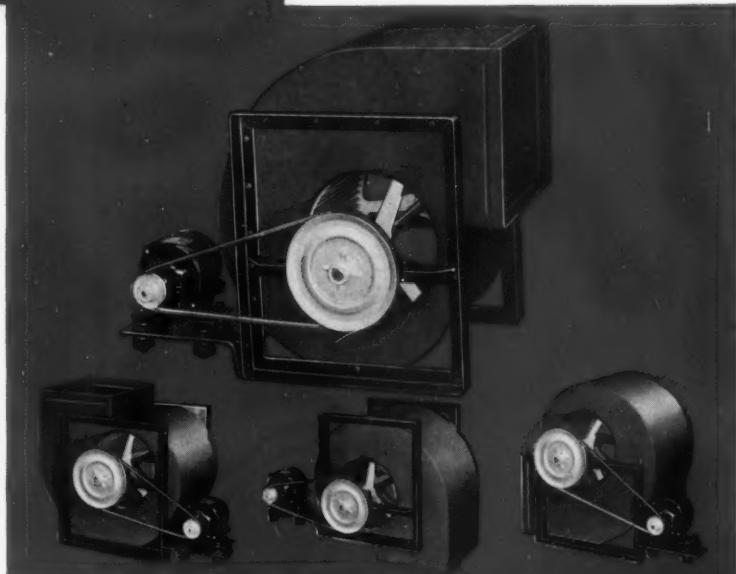
# ARE THINKING ABOUT HOT WEATHER HOME VENTILATION



**HY-DUTY BLOWER WHEELS  
AND SELF-ALIGNING, SELF-  
OILING PILLOW BLOCKS**  
also offered in separate  
equipment.

## HY-DUTY HOME VENTILATOR

A superior model, enclosed in modernistic cabinet—attractive in any surroundings—automatic in operation—turns on or off any hour desired by low voltage time clock control—self-opening and closing outlet shutters—Quiet—Complete with ceiling grill, canvas duct, wired in BX cable—moderately priced.



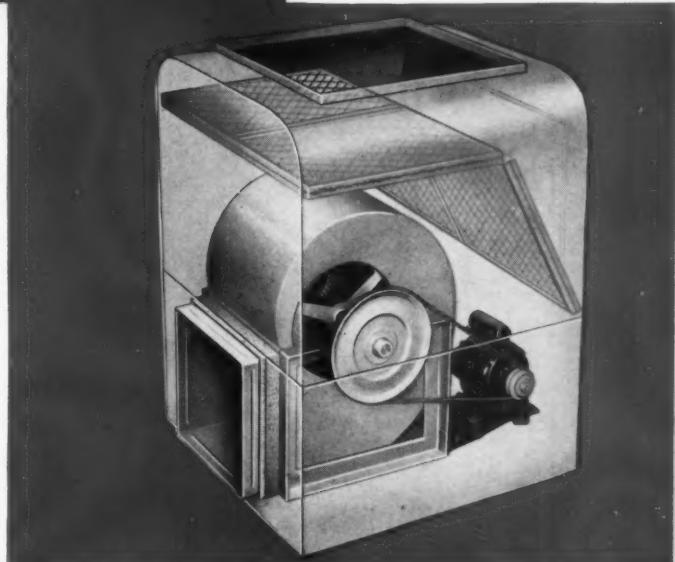
## HY-DUTY BLOWERS FOR HOME VENTILATION ..

offered separately or with complete equipment—low voltage time clock control, ceiling grill, automatic outlet louvres, canvas duct.

There's a Hy-Duty Blower for every ventilating job. Size 10", 12", 14", 17", 20", 25" top horizontal, bottom horizontal—top vertical or bottom vertical discharge—Many superior features insure the finest performance and economy.

*Ask About  
HY-DUTY'S  
3 Big  
Sellers*

**HY-DUTY BLOWER-FILTER**  
*The best value in the competitive field—14" blower, motor with integral overload protection, four filters, welded steel bottom, full floating motor mounting—variable speed pulley, openings cut and flanged, heavy gauge cabinet, canvas connection and clamps, wired in BX cable—Hy-Duty quality—sensibly priced—You can please your customer and out-sell competition.*



MANUFACTURED BY THE BLOWER DIVISION OF  
**KHWITZER-CUMMINS COMPANY**

**PLACE YOUR CHIEF RELIANCE ON THE REPUTATION OF THE MANUFACTURER**

**TO THE MAN WHO  
MERCHANTISES HEATING EQUIPMENT**

**JANITROL**

**FULLY AUTOMATIC GAS-FIRED EQUIPMENT OFFERS A  
GREAT PROFIT OPPORTUNITY**

● Every time the clock ticks some more of your money is invested in rent, salaries and sales effort. Which line of equipment is going to get that money back for you with a volume of profits that will repay you for your time, investment and hard work?

Which line is most attractive? Which has the most salable features? Which is easiest to install . . . requires least service . . . makes satisfied customers? Investigate in any of these directions . . . you will find that the answer is *Janitrol*.

Here is the complete line that meets every customer's requirements . . . made by a company with long-established reputation as specialists in gas heat. Highly develop-

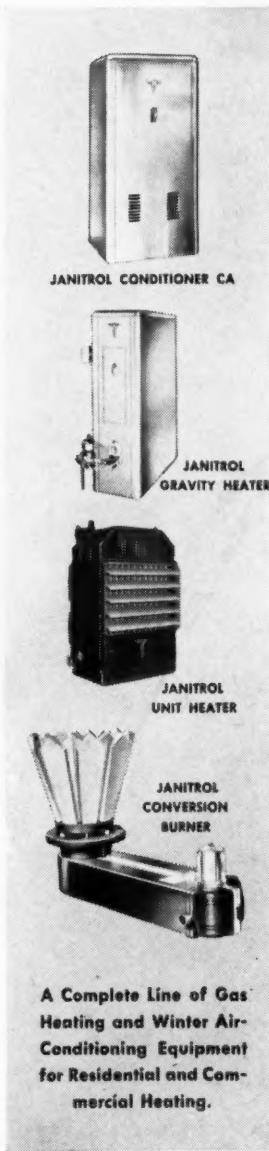
ed laboratory facilities and a competent engineering staff assure design leadership and provide valuable cooperation for you in drafting installation plans.

Right now an extensive 1937 national advertising program is building still greater acceptance for the Janitrol name. Janitrol also offers you sales training help and merchandising cooperation unprecedented in the gas-heat field.

Write for details of this comprehensive plan. Get complete information about Janitrol Winter Air Conditioners and the entire Janitrol line of salable, profit building gas-fired equipment.

SURFACE COMBUSTION CORPORATION  
2377 DORR STREET, TOLEDO, OHIO

**Janitrol**   
GAS-FIRED WINTER AIR CONDITIONERS

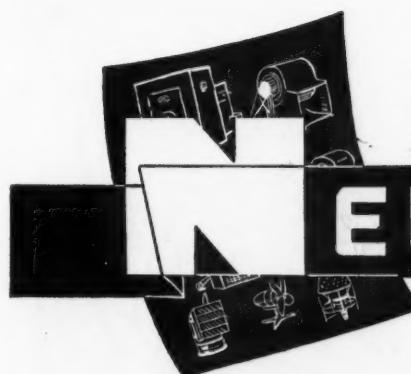


A Complete Line of Gas Heating and Winter Air-Conditioning Equipment for Residential and Commercial Heating.

For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 108 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1936 Directory

△ Indicates product and manufacturer not listed in 1937 Directory



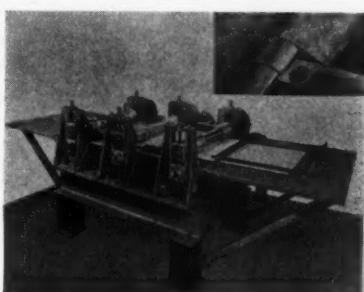
### △39—Interlocking Sheet

Harry R. Ansel, registered mechanical and structural engineer, has formed The Kor-Lok Company, of which he is president, located in the Union Trust Building, Cleveland, Ohio.

This company is introducing to the sheet metal market an interlocking corrugated sheet for roofing and siding that they say defeats capillary attraction and eliminates nail holes.

The KOR-LOK principle is a simple, effective method of avoiding nail holes in galvanized corrugated roofing sheets and hence the leaks caused by them as well as leaks caused by capillary attraction.

The inexpensive machine, furnished to Kor-Lok exclusive dealers, crimps the sides of ordinary corrugated sheets,



forming a unique interlocking joint. The sheets are held fast by a small clip that fits snugly over the curvature along the side of the bottom sheet. The clip in position is nailed to the wood deck. The top sheet is then slid over it into position.

United States and foreign patent rights have been acquired.

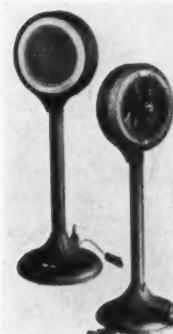
### 40—Attic Ventilating Fan

Reed Unit-Fans, Inc., 730 St. Charles St., New Orleans, has recently developed an attic ventilating fan, designed to furnish adequate air movement in any home.

The Reed Unit principle enables the user to operate either part or the whole capacity at will.

All parts are rubber mounted so no vibration is transmitted to the building. There are two models—6,500 and 13,000 cfm free air delivery.

A new 8-page bulletin describes their ventilating fans for homes, apartments, hotels, space and industrial ventilation.



### △41—Portable Cooler

Hexcel Radiator Company, Racine, Wisconsin, is introducing Hexcels portable unit coolers, adaptable for homes, offices, stores, restaurants and beauty parlors.

Cold water is circulated through a copper coil. A quiet, two-speed fan produces a constant volume of cooled air that is circulated to every part of the room.

The cooler weighs 80 pounds, is  $5\frac{1}{2} \times 18\frac{3}{4}$  inches, finished in brown crackle lacquer, with chromium trim. Water flow through copper coil can be regulated from 0 to 140 gallons per hour. Flexible tubing or hose is used for water connections, and the fan motor is plugged into any outlet.

### 42—New Ducts and Fittings

Lamneck Products, Inc., 414 Dublin Avenue, Columbus, Ohio, has just introduced the new Series 600 Lamneck prefabricated ducts and fittings, with a reduction in the number of items. Series 500 introduced last year included more than 2,000 items. The new series 600 includes only 350 items which Lamneck engineers claim will take care of all installation requirements without the necessity of hand-fabrication of parts. Included are about a hundred involving the use of round pipes various adjustable elbows.

Where rectangular ducts and fittings are concerned, the number of items in the series totals less than 250.

Perl Miller, president of the company, claims that in addition to being more flexible, simple and complete, the

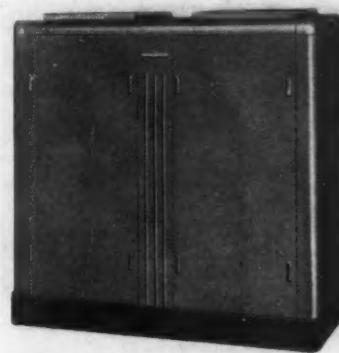
new system is better styled and more attractive.

A new Lamneck Guide Chart and Manual, just off the press, introduces the new Series 600.

### 43—Winter Oil Conditioner

General Electric Co., 570 Lexington Ave., New York City, announces a new oil-burning winter air conditioner. The new conditioner is small in size compared with any ordinary systems designed only for heating. It will clean all incoming air, remove dust, add moisture and heat, and circulate this conditioned air throughout a home. It was designed by General Electric engineers in Bloomfield, N. J., as a companion piece to the gas-fired conditioner recently announced.

Its fundamental principle is a method of burning oil developed by G-E five years ago and since tested in thousands of furnace installations. This fundamental idea is the forcing



downward of atomized oil to meet an upward secondary air stream, producing a floating white-heat flame five feet long that turns upward on itself. Combustion is so complete with this method, they say, that furnace and chimney flues are seldom in need of cleaning, and considerable economy in the consumption of low-grade fuel oils is possible.

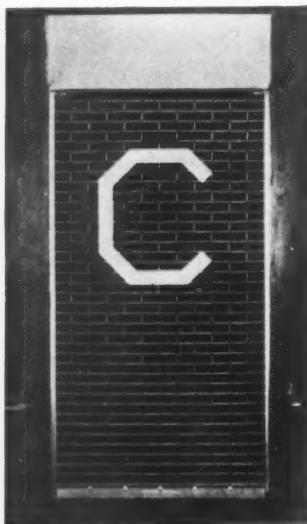
A series of electric controls supervise and protect the equipment. The humidistat automatically controls the supply of moisture to living quarters during the heating season. Air filtering and circulation in summer are available through the installation of a summer switch.

# New Products . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 108

## 44—Monogram Rolling Grille

Cornell Iron Works, Inc., 36-20 Thirteenth street, Long Island City, N. Y., is introducing a new monogram design of rolling grille, patent applied for. Initials, street numbers or trade marks can be made to suit any reasonably simple design submitted and will coil and uncoil with the rolling grille.



Cornell Rolling grilles coil overhead around a horizontal pipe shaft containing the counter-balancing springs. They are retained at the sides in channel shaped rails and are designed to prevent burglary, or trespass of any kind.

## 45—New Type Air Conditioner

The Utica Radiator Corporation of Utica, New York, enters the air conditioning field with a complete departure in design and principle. Heretofore air conditioning equipment which washed the air was confined to large engineered jobs. In the Utica air conditioner, the same type of air washing and treatment and control of the conditioned air is achieved in a line of central plant units for residences.

The Utica air conditioner is built on the hydro-air system of washed air control. There are four standard sizes, each one capable of variable capacities, by adjustment. The line ranges from 500 C.f.m. to 5400 C.f.m.; in terms of heating from 7500 Btu to 480,000 Btu and in terms of cooling from 1½ tons I.M.E. to 20 tons I.M.E.

By the addition of inexpensive parts a Utica unit becomes a summer cooling unit and dehumidifier, or a heating plant in conjunction with a warm air furnace or a split system with steam or hot water boiler.

## 46—Shelf-X

United States Gypsum Company, 300 West Adams St., Chicago, Illinois, is offering Shelf-X, a flat surfaced expanded steel sheet for use in grille work in heating and ventilating units. Shelf-X is achieved by a process of flattening regular diamond mesh expanded metal. There are no mechanical joints, it can be cut in any direction without raveling the strands. It can be welded and plated in standard finishes. Its flat, smooth surface makes it suitable for shelving where small objects can be slid over without tipping. It is sanitary and easy to keep clean.

Shelf-X is available in three meshes and in 13, 16 and 18-gauge open hearth steel. It is also available in chrome nickel steel, straight chrome steel, brass, copper or aluminum. The company provides a design service.

## 47—New Victor Drill

Stanley Electric Tool Division, The Stanley Works, New Britain, Conn., announces a new  $\frac{1}{2}$  in. capacity electric drill No. 124 "Victor." It has been designed to meet the requirements of contractors, oil burner installers and other service mechanics for wood and metal drilling.



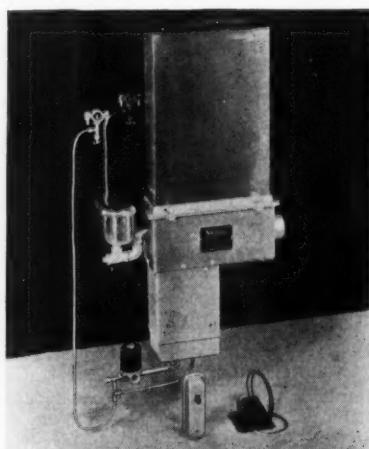
The drill has a combination spade and breast plate handle and a pipe handle that may be detached for working in close quarters. It has a no load chuck speed of 500 r.p.m.

## 48—New Furblo Blower Service

Furblo Company, Hermansville, Michigan, announces their 1937 model. A feature is the top-mounted motor. This made possible the new streamlined cabinet design—gives protection against flooded basements—makes the motor easily accessible for oiling or adjustment—insures silent operation.

Furblo's new cabinet is sectional. Variable speed pulleys will be standard on all 1937 package units. Filter area will be increased.

Furblo's new testing and designing service to furnace manufacturers means the designing of furnace and blower—as component parts of a complete unit.



## 49—Humidifier for Radiator Heat

J. L. Skuttle Company, 4290 West Fort street, Detroit, announces a new direct-fired automatic humidifier especially designed for humidifying radiator-heated homes.

The new Skuttle unit incorporates a special burner which applies more or less heat to the evaporating chamber as more or less humidity is required in the home.

## 50—New Automatic June System

Monmouth Products Company, 201 East 131st St., Cleveland, Ohio, announces the addition of a new lower-priced Automatic June humidifying system, which they say is more easily installed than the system offered a year ago.

The Automatic June system rehumidifies the air in warm air heated homes. There are two types—room control and basement control. The equipment consists of a vitreous enameled cast iron water pan, supported level inside of the furnace casing top, in a slide support so that the water pan may be withdrawn like a drawer. Crosswise upon the pan, a series of porous evaporating plates are placed in notches. The middle portion of these plates extends downward into the water in the pan. The plates have fine pores which draw up the water from the pan by capillary action, thus keeping the plates saturated. The warmed air which circulates through the furnace casing to the rooms passes across the wet vertical surfaces of the evaporating plates, rapidly absorbing moisture. The pan, which is only 3 inches wide, acts mainly as a support for the plates and a channel to carry the water to the plates. As many plates as necessary, up to 30, may be used.

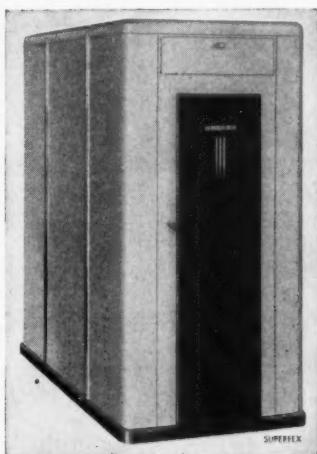
# New Products . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 108

## 51—A-C Heating Plants

Perfection Stove Company, Cleveland, Ohio, announces new and attractively styled models of the Superfex oil burning air conditioning heating plants.

There are three sizes, with heating capacities of 65,000, 100,000, and 140,000 B.T.U.



Continuous conditioned air, made possible by the high and low flame principle, with constant forced circulation of automatically humidified air, is a feature of Superfex, according to the announcement.

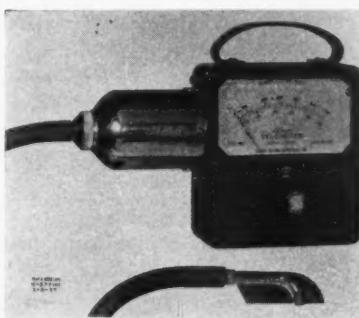
One of the advantages of the Superfex claimed is that it supplies conditioned air day and night. It is not an on-and-off system. Conditioned air is circulated at low flame as well as when the thermostat calls for more heat.

The Superfex plants are complete in a compact unit, styled on modern lines, finished in maroon-red and black wrinkle-lacquer, with stainless steel and chrome trim.

## △52—Primer for Chromium

Maas & Waldstein Company, 420 Lexington Avenue, New York City, recently developed a new primer. The new product, known as "Chroprime," is a clear primer which can be applied to the metal surface by spraying or dipping, after which it is baked. It adheres tenaciously to the metal and provides an excellent foundation for any kind of lacquer enamel. It resists heat, remains flexible, and permits the metal to be engraved after it is applied. Chroprime can also be used as a durable under-coat for finishing other metals. Chromium is notably difficult to lacquer or enamel, but by the use of this new primer can be finished in any desired color.

## •53—New Filter Attachment



Illinois Testing Laboratories, Inc., 420 N. La Salle Street, Chicago, Illinois, announces the "Alnor" Velometer with a new filter attachment to permit the use of this instrument in dust laden atmosphere either of the magnetic type dust or ordinary dust.

The instrument can be scaled for direct reading with the filter attached and a conversion chart provided when readings are desired without the filter attached.

## 54—Model CJR Burner

Scott-Newcomb, Inc., 1922 Pine St., St. Louis, has gotten out a compact burner model which they call the CJR.

The transformer is mounted underneath the motor, and the air blast tube is a departure from their standard curved air duct, and in this instance, is made with its center line in the center of the blower housing.

All parts standard on all other



Scott-Newcomb burners, such as the dual seal pump, slow speed motor, Pioneer fuel saver, three fuel screens, gyro dual air mixture, and baked on enamel, are used on this model.



## 55—New Current Saving Welders

The Hobart Brothers Co., Troy, Ohio, announces the new Hobart "Serial MN Current-Saving Models" embodying (in addition to an improved type of wheel mounting with low center of gravity) what is termed as "Selective Motor HP Control." It is said that this is the first arc welding set equipped with economical control of the motor as well as the generator.

Only  $\frac{1}{3}$  the usual starting current is required—the power factor of the machine and its efficiency are materially improved—and it is possible to use the equivalent of a motor of one-half the horsepower rating for welding in ranges up to  $\frac{1}{2}$  to  $\frac{2}{3}$  the rated capacity of the generator.

## ◆56—New Berloy Building Line

The Berger Mfg. Co., Canton, O., Republic Steel Corp., subsidiary, will re-enter the building products fabrication field, in which it has not been active for several years, with a complete line of building products, according to L. S. Hamaker, executive vice president and general manager.

The new line will be manufactured under the Berloy trademark and will supplement the company's present line of sheet metal products. R. I. Schuppener, who has had more than 20 years' experience as a sales executive with the Milcor Steel Co., the Klauer Mfg. Co., and Wheeling Corrugating Co., will act as general sales manager of the new division.

Among the products which the company will start producing shortly after January 1st are eaves troughs, conductor pipe, gutters, valleys, and ridgings. In addition they will have complete lines of trimmings and accessories, galvanized and black sheets, ternes and coke plates. Other products will include roofing, siding, shingles, metal ceiling, metal lath, corner beads, channels and accessories. Metal windows, metal lumber, coal windows, wire products, furnace and ventilating pipe and accessories will also be produced.

The new building line will utilize Republic products including Toncan iron, copper bearing steel, and galvanized steel, and will be distributed through jobbers and dealers.

*Customer Satisfaction-*

*Long  
After  
Price is Forgotten*

Don't handicap your future customer goodwill by recommending and installing ventilators extolled to be "just as good." It may cost you much to do so—in lost future business. Customers value "real service" more than "a few dollars saving"—they want *lasting satisfaction—not excuses.*

You can insure yourself against lost customer goodwill by standardizing on the genuine "Swartwout Rotary"—the ventilator that has stood the test of years and has Industry's stamp of approval. Guard your customers against inferior substitutes and they will guard your future business.

*Write for data, price list and discounts.*

**The  
SWARTWOUT COMPANY**

18615 Euclid Avenue,  
Cleveland, Ohio

**Swartwout**  
ROTARY BRONZE BALL BEARING  
**Ventilators**

## Association Activities . . .

### Saint Louis

The Associated Sheet Metal, Air Conditioning and Heating Contractors of St. Louis, Inc., held a meeting on March 15, and in an endeavor to get all of the contractors in the area interested in their own association, four speakers from the Master Plumbers gave interesting talks. They were:

Ed Quinn, president of the Missouri State Master Plumbers Association

Ed Monteath, National Director of the St. Louis area for the National Association of Master Plumbers

Sam Burman, president of the Contracting Plumbers of St. Louis

D. G. Cunningham, a past president.

About fifty sheet metal contractors were present. The association provided a luncheon after the meeting.

Oscar P. Brauer.

### The Galvanizers Committee

The second meeting of The Galvanizers Committee sponsored by American Zinc Institute, Inc., 60 East 42nd Street, New York, N. Y., will be held at the Hotel Statler, St. Louis, Missouri, on Monday, Tuesday and Wednesday, April 26, 27 and 28.

Monday morning: American Zinc Institute's report on the Institute's promotional program.

Monday afternoon: Round table conference for members of committee.

Monday evening: Joint dinner and entertainment. The guest speaker will be an outstanding member of the steel industry.

Tuesday: Joint meeting with a number of technical papers. Informal smoker and buffet supper.

Wednesday morning: A number of interesting papers will be presented and discussed, followed by a short business session.

Wednesday afternoon: Visit new hot and cold strip mills and galvanizing department of the Granite City Steel Company.

F. G. White, Chairman.

### National

General Bulletin No. 32 of the National Warm Air Heating and Air Conditioning Association, Columbus, Ohio, calls attention to the June convention which they say will be a great occasion. The program is in preparation and has progressed sufficiently to predict that every minute will be helpful and snappy.

Dates—June 8, 9 and 10.

Place—Hotel Cleveland, Cleveland, Ohio.

The new technical mechanical code has been released by the Installation Codes Committee under the direction of Chairman, Prof. J. D. Hoffman. This code is not intended to take the place of the non-technical code which is expected to continue as popular and reliable as ever. Members are offered a limited number of additional copies. To non-members, there will be a small charge. The Bulletin also quotes quantity prices.

Late last summer the Research Staff distributed copies of "A Tentative Code for Rating of Oil Furnaces" to all members of the association. The Staff is asking the co-operation of all manufacturers. They ask in what way the Code can be improved; if sufficient information is given so that a testing unit could be set up and performance data obtained; and if your company has built or is intending to build a testing unit similar to that recommended in the Code.

The renewal of the Association's contract with the University of Illinois is announced.

## Association Activities . . .

### New York State

The 1937 convention and display of the New York State Sheet Metal, Roofing & Air Conditioning Contractors' Association, Inc., is to be held at the Hotel Seneca, Rochester, New York, on April 26, 27 and 28, 1937.

The display will include air conditioning equipment, sheet metal products and roofing materials. 32 manufacturers are exhibiting.

The program follows:

#### Monday, April 26

Opening of Meeting—by President James Keays.  
Welcome Address.

Mayor Charles Stanton, Rochester, New York  
Everybody get acquainted.

"Roofing & Water Proofing"—Elmer R. Hyde, Technical Department Koppers Co.

"5,000 Years of Roofing"—George Ballard.

#### Recess

"Business in Politics"—H. A. Daniel.

"Warm Air Heating & Air Conditioning"—S. Konzo, Special Research Associate, Engineering Experiment Station University of Illinois.

"Outlook for Business in 1937"—H. T. Richardson, Richardson & Boynton Co.

"Copper for Roofing"—Carter S. Cole, Engineer, Copper & Brass Research Ass'n.

#### Recess

"What an Opportunity"—Tom Byrd, American Rolling Mill.

Moving Pictures—American Rolling Mill.

Entertainment—Refreshments.

#### Tuesday, April 27

"Merchandising"—Frank Harmon, Lennox Furnace Co.

"Insurable Hazards in Our Business"—Roy Duffus, Secretary, James Johnson Insurance Co.

"Unemployment & Compensation Insurance"—Joseph P. Craugh, Assistant Attorney General, New York State Dept. of Labor.

#### Recess

Luncheon with Architects and Engineers.

"Federal Housing"—John J. Wade, A.I.A. Chief Architect, Federal Housing Administration, Western N. Y. District

"New Technical Code"—E. B. Root, Engineer, Dail Steel Products Co.

"Choosing and Picking Business"—Edwin A. Scott, Editor of Sheet Metal Worker.

"Codes & Licensing"—J. D. Wilder, Editor of American Artisan.

#### Recess

Moving Pictures—The Barrett Company.

Entertainment—Refreshments.

#### Wednesday, April 28

"Manufacturers & Jobbers Representatives"—Discussion with Contractors.

"Stainless Applications to the Sheet Metal Industry"—R. S. Lynch, Metallurgical Staff, Republic Steel Corp.

"Welding Demonstration of Stainless Steel and Galvanized Iron"—Lincoln Electric Company.

#### Recess

Reports of Officers and Committees.

Questions and suggestions.

Nomination and selection of New Officers.

Installation of New Officers.

#### Recess

Banquet.

Entertainment.

Dancing.

William Schmitt, Rochester, Chairman of the Convention.  
James Keays, Albany, President.

Clarence J. Meyer, Buffalo, Secretary.

**WE BUILD a BETTER CANOPY with our LINCOLN WELDER**

A black and white photograph shows a large, ornate canopy being installed on the side of a brick building. The canopy has decorative scrollwork and a sign that reads "Edgar & Sons". Several workers are visible, one standing on a platform and another working on the canopy itself. The Lincoln Arc Welder is used to join the metal parts of the canopy.

"**O**NE of our chief items is the Accurate All-Metal Canopy. When we first started to make these, many parts were riveted and bolted . . . Now, by means of our Lincoln Arc Welder, we join these parts by welding. "Our canopy is stronger—much more rigid—more economical for the user and, by far, better looking. "Naturally we are pleased, for our aim is to satisfy the customer by giving him a better job at the lowest possible cost. This we are able to do by using our Lincoln Arc Welder where at all possible."

R. H. GUENTHER, Gen. Mgr.  
Accurate Mfg. Works, Chicago, Ill.

Better products . . . and better business are yours, too, if you'll just equip your shop with one of these easy-to-operate Lincoln welders. They cost as little as \$200 and can be paid for on easy terms. The coupon will bring complete details.

#### THE LINCOLN ELECTRIC COMPANY

*Largest Manufacturers of Arc Welding Equipment in the World*

#### MAIL THIS COUPON TODAY

- •
- THE LINCOLN ELECTRIC COMPANY  
Dept. EE-364, Cleveland, Ohio
- Please send details about the Lincoln Welders
- for sheet metal shops.
- Name \_\_\_\_\_
- Company \_\_\_\_\_
- Address \_\_\_\_\_
- City \_\_\_\_\_ State \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## News Items . . . . .

### O. P. Schlafer Dies

O. P. Schlafer, pioneer hardware dealer and sheet metal contractor of Appleton, Wisconsin, died February 16 at Orangeburg, S. C., at the age of 78.

### Olson in Wichita

Gilbert E. Olson has re-entered the sheet metal contracting business, locating at 124 South Ida St., Wichita, Kansas. In addition to sheet metal work, Mr. Olson will handle heating and air conditioning.

### James Shows Extensive Displays

James Supply Co., distributors, 515 E. Eleventh St., Chattanooga, Tenn., show very extensive displays in Sunbeam Warm air furnaces, air conditioning units and plumbing fixtures.

### Angel Stages Campaign

Angel Sheet Metal Works, 618 Julia St., New Orleans, Louisiana, staged a promotional campaign on roofing and sheet metal work in January.

### Elcan to Carry On Sherrod Business

Frank C. Elcan will conduct the Sheet Metal and Plumbing establishment at Covington, Tenn., operated by the late F. S. Sherrod who died suddenly while on a roofing job at Ripley, Tenn., recently.

### Home Modernization Theme of Exposition

Plans are announced for the National House and Garden Exposition to be held at the Coliseum in Chicago from May 8 to 16. The show will feature all that is new and practical in residential construction methods, building material and home equipment.

The show will be under the management of John A. Servas, veteran exposition builder.

Space reservations are being accepted at the headquarters of the National House and Garden Exposition, Room 605, Builders Building, 228 North La Salle Street, Chicago.

### Insured Mortgage Portfolio

Insured Mortgage Portfolio—Vol. 1, No. 9—March, 1937, published by the Federal Housing Administration, Washington, contains the following articles of interest to contractors:

Congress Extends the Guarantee.

A Savings Banker Views Insured Loans, by Parker S. Maddux.

City Growth and Mortgage Risk.

Yields on Insured Mortgages.

Why Our Association Makes FHA Loans, by W. W. McAllister.

Locations for Large-Scale Housing.

Vital Statistics of Mortgage Insurance.

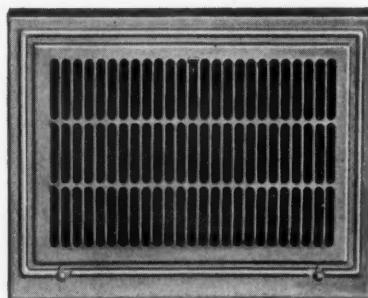
### Air Conditioning Conference

The University of Wisconsin, Department of Mechanical Engineering, Madison, Wisconsin, is sponsoring a conference on air conditioning and automatic heating to be held at the University in Madison on April 21, 22 and 23, with exhibit space all sold.

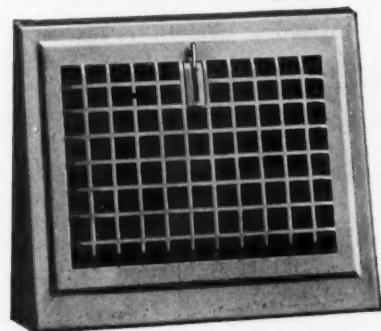
The human power plant, the automatic stoker, year around hot water, air distribution, filters, evaporating coils, controls, insulation, oil burners, cooperation between oil distributors and heating industry, physiological factors, relation of the gas industry, direct and indirect fired air conditioning, coal for stoker use, sales arguments for gas heating, advantages of combined stoker boiler units, the future of air conditioning, installment selling, and year-around air conditioning, are some of the subjects on the tentative program, each to be discussed by an authority on his particular subject.

# Easier Installation? Ask the Man on the Job!

The fact that AUER Stamped Steel Registers actually do have special features for faster, easier installation, and a neat, tight, streak-proof job, means money in the pocket of any heating contractor. But that's only one reason why AUER Registers "have the call." The trim, modern styling of AUER models, their extra durability, their careful, correct design for maximum efficiency — these basic qualities can be depended upon in every AUER product. Ask for catalog illustrating complete line of Registers, Cold Air Faces, and Grilles for both warm air and air conditioning.



Elite Two-Piece Register



Aristocrat Baseboard Register

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO  
**AUER** DISTINCTIVE **REGISTERS**  
 & GRILLES  For Air Conditioning and Gravity

## News Items . . . . .

### New Incorporations and Dealer News

The Industrial Sheet Metal Works, Inc., 628 East Forest Ave., Detroit, Mich., has increased its capital stock from \$25,000 to \$50,000.

The Leeson Air Conditioning Corporation has been incorporated with a capital stock of \$50,000, and succeeds to the heating and sheet metal business of T. F. Leeson, 14631 Myers Road, Detroit, Mich.

Carl C. Dickinson has engaged in the sheet metal business at 2211 N. E. Union, Portland, Ore.

The Advance Painting & Sheet Metal Co. has engaged in business at 2111 Kinnic Ave., Milwaukee, Wis.

The Contractors Sheet Metal Works has been established at 2604 S. Harcourt Ave., Los Angeles, Cal., by Alfred J. Chapman and Edward S. Robinson.

The U. S. Furnace Co. has been incorporated with a capital of \$1,000 at 148 N. Rose St., Kalamazoo, Mich.

The National Metal Products Corporation, 903 Hammond Blvd., Howell, Mich., has been incorporated with a capital stock of \$50,000, of which \$26,000 has been paid in.

Dutton-Cochran, heating and ventilating, San Francisco, Cal., has moved from 50 Hawthorne to 450 Cortland Avenue.

The B. & H. Heating Co. has been formed in Portland, Ore., to engage in the heating, furnace and sheet metal business by Thomas J. Herrell and Carl Gross, 3304 N. E. 46th St.

The Mamco Manufacturing Co., heating appliances, has been incorporated in Seattle, Wash., with a capital of \$49,000, by Waldo E. Mather, T. D. McVicar and Eugene Anthony.

Jules Arnold has sold his air conditioning equipment business at 2122 West Seventh street, Los Angeles, Cal., to the Gasoliter Sales Co., Inc.

The Heat-O-Matic Products Co., at 1313 Firestone Blvd.,

Los Angeles, Cal., has been formed by Wm. H. Mihall, 324 Oak St., Glendale, Cal., and J. A. Hastert, 418 West Palmer Ave., Compton, Cal.

The Knudson Heating Co. has engaged in the heating, furnace, repairing and installation business at 2611 N. E. Union, under the management of A. Knudson, Portland, Ore.

The United Sheet Metal Works, Inc., has been chartered in Milwaukee, Wis., by Max Litow and George A. Porth, and others.

J. Rosen & Son, composed of Jacob Rosen and Lester Rosen, have engaged in the sheet metal contracting business at 1460 South Central avenue, Los Angeles, Cal.

The Calvert Metal Manufacturing Co., 130 South Calverton Road, Baltimore, Md., has plans in progress for a new building.

The Heating & Piping Contractors Association of Baltimore, Inc., Baltimore, Md., has been chartered by John H. Zink, 424 E. Saratoga St., Howard E. Crook and others.

The Corpus Christi Roofing & Sheet Metal Co. has roofing and sheet metal contract on the synagogue in Corpus Christi, Tex.

The Controlled Air Corporation has been chartered in St. Louis, Mo., with a capital stock of \$100,000 by C. M. E. Reeves, 4535 Lindel Blvd., and Joseph L. Weiner.

The Moore Metals Co. has been incorporated in Charlotte, N. C., with a capital of \$50,000, by A. V. Moore, 241 S. Hawthorne Road, Winston-Salem, and L. P. Hyatt.

The Michigan Tank & Galvanizing Co., 14101 Prairie Ave., Detroit, Mich., has increased its capital stock from \$60,000 to \$90,000.

Miller's Sheet Metal Works has engaged in business in Eugene, Ore., under management of Carl Miller.

The American Sheet Metal Works, Inc., Portland, Ore., has increased its capital stock to \$100,000.

The death is reported of Alvert I. Ossinger, engaged in the sheet metal business in Seattle, Wash.

The Zenith Furnace Plant, 59th Ave., W. & N. P. Tracks, Duluth, Minn., has begun erection of a \$2,000 addition.

## Fast, Easy Operation with this Niagara No. 172

Advanced in design, this motor driven Combination Machine with interchangeable rolls offers the modern sheet metal worker, power operation at a minimum cost. No longer necessary to hold and guide the work with one hand while the other turns the crank. This Niagara Electric Combination Machine leaves both hands to manipulate the work. Rotation of rolls is controlled by hand or foot operated clutch. When desired, clutch can be locked for continuous motion. Upper roll may be raised and lowered by foot treadle or crank screw.

When You Need Machines for Sheet Metal Work, You Can Get Them from the Complete Niagara Line of

Folders—Brakes  
Rotary Machines

Burring  
Turning  
Wiring  
Edging  
Beading  
Crimping  
Flanging  
Corrugating  
Forming and Curving  
Combination Machines  
Setting Down  
Machines

Groovers—Seamers  
Slip Roll Formers  
Snips—Hand Tools  
Stakes—Roofing Tools  
Lever Shears and Punches  
Shears, Squaring and Rotary

### Electric Combination Machine

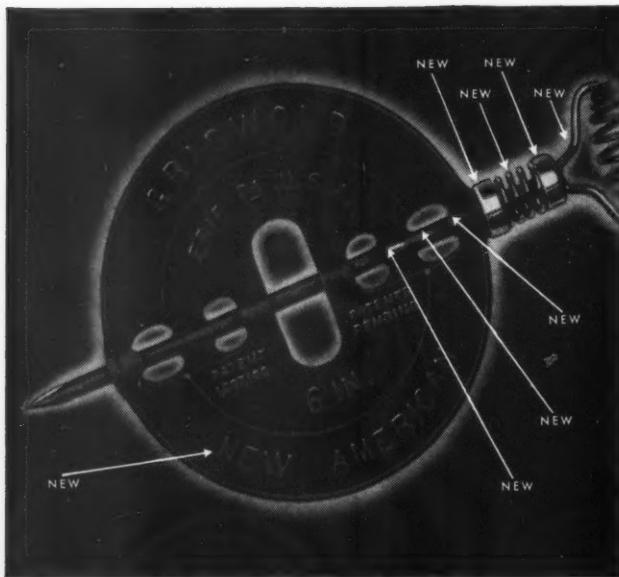
for  
Single Beading  
O. G. Beading  
Slitting  
Wiring  
Turning  
Burring  
Crimping

**NIAGARA MACHINE & TOOL WORKS**

General Offices and Factory  
683 Northland Ave. BUFFALO, N. Y.



**NIAGARA**



## Easier installation with the Griswold NEW AMERICAN DAMPER

Stove and furnace men everywhere are hailing the genuine Griswold NEW AMERICAN Damper as the greatest advance in damper design. New, exclusive features make it even easier than ever to install. Jobbers find that its superior quality makes it the most satisfactory and easiest to sell. Dealers find that a very small difference in price makes a vast difference in quality and satisfaction when they specify Griswold "New American."

### NEW FEATURES FOR EASIER INSTALLATION

- 1 New improved design with hump on spindle that goes straight through pipe before spindle point enters opposite side of pipe. (No need to put hand inside stove pipe while installing.)
- 2 Improved spindle slips easily and freely through plate. A twist of the wrist and hump on spindle drops into notch, insuring positive lock.
- 3 Exclusive hump guide on plate leads spindle hump into locking position without fail.
- 4 New design reversible plate allows one-piece, nonbreakable steel spindle to be easily inserted from either side.
- 5 Size marked on both sides of plates.
- 6 Sharp point of spindle pierces any ordinary stove pipe, leaving a clean hole same size as spindle.
- 7 New improved full tension spring with nickel finished ferrules, not affected by heat.
- 8 Ferrules and spring do not fall off spindle while assembling . . . a useful time-and-tempo-saving feature.

**WRITE TODAY** for details and prices on the world's most complete line of dampers. Regular size 3" to 7". Furnace, 8" to 18". Oval, 4" to 8". Or place order with your jobber now for specified delivery dates. THE GRISWOLD MFG. CO., Erie, Pa.



## News Items

### New Salem Heating Shop

Sidney S. Day, Inc., heating equipment, has been chartered in Salem, Ore., with a capital of \$5,000, by J. E. Van Wyngard, Sidney S. and Robin D. Day.

### New Sheet Metal Shop in Milwaukee

The Advance Painting & Sheet Metal Co., has opened a sheet metal shop at 2111 South Kinnic Ave., Milwaukee, Wis.

### Detroit Concern Increases Capital

The Industrial Sheet Metal Works, Inc., 628 East Forest Ave., Detroit, Mich., has increased its capital stock from \$25,000 to \$50,000.

### Detroit Concern Incorporates

T. F. Leeson, engaged in the heating and sheet metal business at 14631 Myers Road, Detroit, Mich., has incorporated his business under the name of Leeson Air Conditioning Corporation, with a capital stock of \$50,000, all of which has been subscribed.

### New San Francisco Shop

The Daly City Sheet Metal Works has engaged in business at 6739 Mission street, San Francisco, Cal., under management of Frank Neumann.

### A. C. Concern Buys Plant

The Louis Provincial Co., doing a roofing, sheet metal, ventilation and air conditioning business at 1322-24 Marshall Street, Northeast, Minneapolis, Minn., has purchased the building at that address.

### New Furnace Dealer

The U. S. Furnace Co., 148 North Rose street, Kalamazoo, Mich., has been incorporated to deal in furnaces, with a capital stock of \$1,000.

### New Michigan Concern

The National Metal Products Corporation has been chartered to alter and assemble metal, with headquarters at 903 Hammond building, Howell, Michigan, with a capital stock of \$50,000, of which \$26,000 has been paid in.

### Ornamental Sheet Metal Products

The Master Metal Works has been established at 4730 Avalon Blvd., Los Angeles, California, to turn out ornamental sheet metal products, by Edwin Scholz, 4730 Avalon Blvd., Los Angeles, and Martin Nagy, 8163 San Juan, South Gate, Cal.

### Bitterman of Lexington Active

C. Bitterman Sheet Metal Works, at 511 East Vine St., Lexington, Kentucky, has had a very active autumn season on roofing work. Many homes, stores and country places have been modernized and repaired and there has been considerable new building on which metal roofs were installed. The firm features an expert service at all times.

### New Warehouse at Chattanooga

Work started in December on a three story, 80x260 foot warehouse of concrete construction with sheet metal sides for the Tennessee Furniture Corporation, Chattanooga, Tenn. It is designed by Architects Sears and Shepherd, Chattanooga, and the Struck Construction Co., Louisville, Kentucky, is general contractor. The building will cost about \$65,000 and is located just east of Central Avenue near the Odorless Refrigerator unit of the company.

## With the Manufacturers . . .

### C. M. Lyman Dies

Clarence M. Lyman passed away at his home in New Hartford, New York, on February 28. For many years Mr. Lyman was associated with the International Heater Company of Utica, New York, and served as a member of the Research Advisory Committee and also of the Installation Codes Committee of the National Warm Air Heating and Air Conditioning Association for a number of years.

The industry is under many obligations to Mr. Lyman for his valuable assistance.

### Parker Appointed Sales Manager



F. N. Parker, for twenty years with Round Oak Company, Dowagiac, Michigan, as engineer and advertising manager, has been appointed sales manager.

Mr. Parker's work as general sales manager will bring him in closer contact with contractors.

### Death of Professor Elihu Thomson

Professor Elihu Thomson, 83, dean of American scientists, and one of the founders of the General Electric Company, died at his home in Swampscott, Mass., March 13. Professor Thomson, together with Thomas A. Edison, James J. Wood, and Charles F. Brush were the great quartet which created the modern electrical industry.

Elihu Thomson was one of America's greatest pioneers in the field of electrical science. His technical work was directly reflected in practical developments, as he was one of the most far-sighted of the early arc-light inventors, and experimented with the principle of alternating-current transmission far in advance of commercial demands. He held upward of 700 patents in the United States alone.

He originated the resistance method of electric welding, which has been in continuous use from 1887 to the present time; developed the repulsion type of induction electric motor; invented the magnetic blow-out principle in lightning arresters and electric switches, the oil-cooled type of transformer, the constant-current transformer, and the modern process of commercially treating fused quartz.



### Schaefer Moves to New Factory

Schaefer Brush Manufacturing Company celebrated the new year by moving to a new, three-story, modern brick factory at 117 West Walker Street, Milwaukee, Wisconsin.

The most up-to-date brush making machinery was installed. The company makes a furnace brush.

## HERE'S PROOF OF THE POWER AND DRILLING SPEED of SKILSAW'S NEW DEFENDER DRILLS



NEVER before such performance . . . such quality construction and engineering in low priced drills! Bearings are ball and self-lubricating Oilite bronze. Motor has extra overload capacity for cool running and longer life. Special alloy-steel gears, helical cut for quiet operation. Die-cast alloy frames for strength and lightness. Compare their specifications, power and speed and you will see why DEFENDER Drills are the biggest drill "buy" on the market.

See Your Distributor and Write for Our Catalog

**SKILSAW, INC.**  
**3302 ELSTON AVENUE, CHICAGO**

210 E. 40th Street, New York • 52 Brookline Avenue, Boston  
312 Omar Avenue, Los Angeles • 2065 Webster Street, Oakland

## With the Manufacturers . . .



### Rudy Engineering Clinic

Rudy Furnace Company, Dowagiac, Michigan, sponsored an engineering clinic at the Oliver Hotel, South Bend, Indiana, on March 8 and 9. Sidney B. Tremble welcomed the group. Tom W. Torr, chief engineer, and John S. Cunningham, assistant engineer, headed the meeting devoted to engineering problems and their solution. H. R. Harrison, sales manager, took part in the program, explaining "The Benefits Derived from Knowing How."

Outstanding in the two-day course of instruction this year was the introduction of a series of charts for figuring heat losses, which had been prepared by Rudy engineers.

More than 250 Rudy dealers attended the school this year.



### Edwards Completes Plant

The Edwards Manufacturing Company, Fifth Street and Eggleston Avenue, Cincinnati, has completed a new ultra-modern plant.

The new structure is made of steel and reinforced concrete, and enclosed with insulated steel and glass walls. There are no columns in the exterior wall which are virtually one continuous window in each of the two stories. William M. Carlton, chief engineer of The Edwards Company, explained that this was attained by setting the columns back in the building and cantilevering the floor and roof construction.

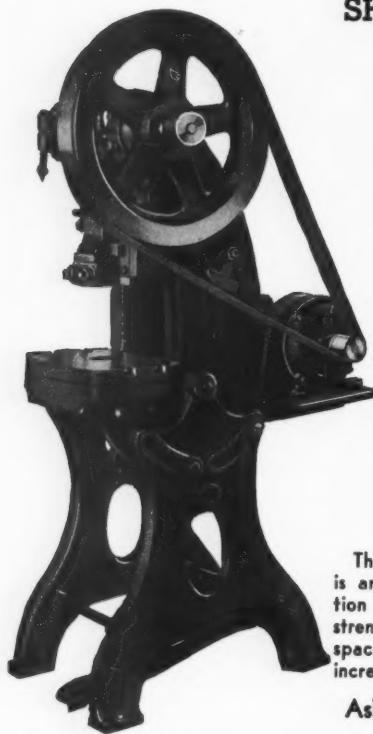
The new structure, 50 by 200 feet, is the first unit of an ultimate building to cover the entire area owned by the company.

All elements of the building of a sheet metal nature, were fabricated in the Edwards plant.

Rolled-steel piling was used to provide foundations. These piling, shaped similar to the letter "H," were driven to a depth of 80 feet below the street level.

## The MARSHALLTOWN Line

**PRESSES—Capacities from 10 ton to 70 ton.**  
**SHEARS—Capacities 18 gauge to 1/2" plate.**



No. 116  
THROAT SHEAR  
Is especially designed  
for Cutting Inside Circles  
and Irregular Shapes.

No. 2  
PRESS  
This ruggedly constructed Press  
is arranged with proper distribution  
of weight giving maximum  
strength and affording ample die  
space, low operating cost and  
increased output.

Ask Your Jobber or Write

Marshalltown Manufacturing Co.  
MARSHALLTOWN  
IOWA



No. 18  
MOTOR POWER  
THROATLESS  
SHEAR  
Complete with 1/2  
HP standard motor,  
self-feeding and easy  
to operate.



No. 18  
HAND POWER  
THROATLESS SHEAR

For irregular cutting  
or straight splitting of  
18 gauge sheets or  
lighter. Will cut sheets  
of any dimensions.



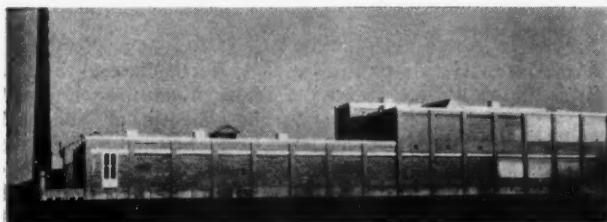
## With the Manufacturers . . .

### Grand Rapids Furnace Cleaner Moves

The Grand Rapids Furnace Cleaner Company announces the removal of their offices and factory to 1330 Phillips S. W., corner Stevens Street, Grand Rapids, Michigan.

The Will-Burt Co., Orrville, Ohio, at a directors' meeting in December, authorized an increase in both plant and equipment. Construction is now under way that will add 13,800 feet of floor space to the plant; also, additional warehouse facilities are being provided for stocking completed stokers.

A new building is planned for the Engineering Department and testing laboratory.



### Armco Stainless in Cudahy Plant

More than 3,800 pounds of Armco stainless steel, manufactured by The American Rolling Mill Company, Middletown, Ohio, were used on the exterior of the Cudahy Packing Company's new plant at Albany, Georgia.

All of the cornices and coping are formed of 18-8 stainless, effecting a brilliant outline against the sky. Walls of the exterior are of tile and glass brick.

Fabricating was done by the Albany Sheet Metal Products Company.

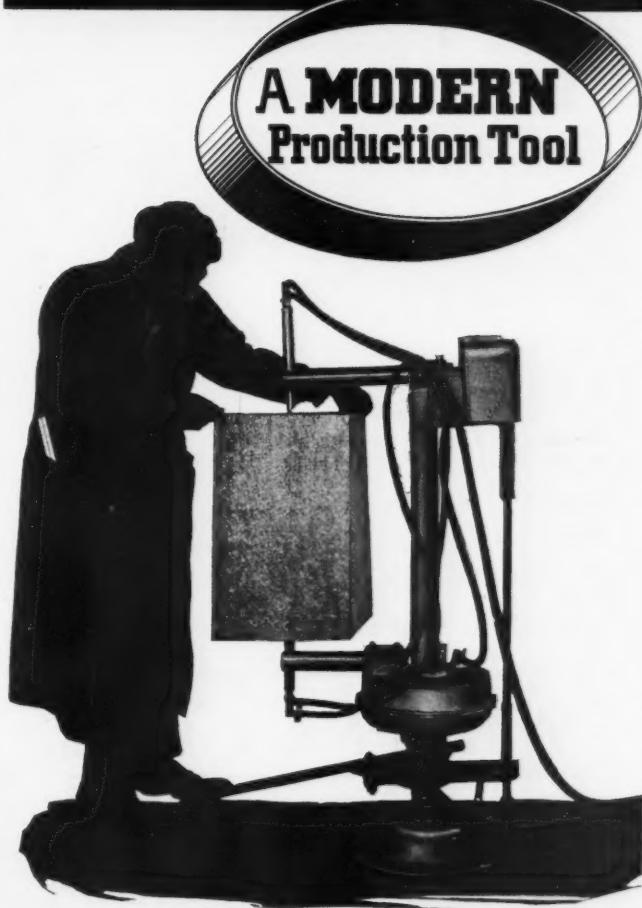


### Lamneck Conducts School

Lamneck Products, Inc., 414 Dublin Avenue, Columbus, Ohio, is conducting classes to teach branch manager and executives of those companies producing air conditioning equipment and adopting the Lamneck system for its duct installations.

The illustration shows the first class at the close of an all-day session after the new system had been fully explained and demonstrated. These men are figuring an estimate with the aid of the new Lamneck Guide Chart and Manual.

Perl Miller, president of the company, is the interested gentleman standing in the rear of the room at the left.



### IMPROVED in Efficiency —REDUCED IN COST !

You get ALL the features of welders selling at several times its price in this new model "P" Micro-Weld Spot Welder. It's a masterpiece of simplified modern design and skillful use of the newer materials. Built for manufacturing application . . . yet suitable in utility and price for even small shops. Outstanding features are:

- Snap action switch with removable contacts . . . breaks instantly under load. Provided with arc blowouts.
- Revolutionary new-type 5 kw transformer shielded in non-ferrous housing.
- Heat switch gives four separate heats.
- Lower arm and transformer are one unit, which may be moved and set at any point on the vertical column, to accommodate work of all sorts.

Full details and low prices on request. WRITE—see how this new Micro-Weld machine will fit your needs.

**MICRO PRODUCTS CO.**

PEORIA

ILLINOIS

# FIRELINE

**gives any  
furnace a  
modern  
REFRACTORY  
LINING**

HOME heating efficiency has advanced from open fire to fireplace, to stove, to furnace—and now to *refractory lined* heating plants.

Today every furnace can be modernized for FIRELINE comes in *plastic* form—is easily molded to any thickness entirely around the firepot and sets into a one-piece firebrick lining. Modernizing furnaces with FIRELINE is profitable work. It is profitable for homeowners too, for it (1) increases heating plant capacity (2) saves up to 20% of fuel (3) eliminates smoke and soot (4) burns fuel completely—ends ash sifting (5) makes even badly cracked and broken firepots gastite (6) protects new castings—prevents them from burning out.

Recommend FIRELINE with confidence—it is fully guaranteed by an AAAI manufacturer. Recommend it to everyone, and

**SAMPLE  
FREE**

and full detail, data, sales helps, prices, etc.



watch your business grow. This is a big thing, a major development. Introduced but two years ago, FIRELINE is stocked by jobbers everywhere. Be first in your community—effective sales helps furnished. Write today.

**Fireline Stove & Furnace Lining Co.**  
1866 Kingsbury Street Chicago, U. S. A.

## WHITNEY LEVER PUNCHES

No. 4B PUNCH



Length—8½ inches. Capacity— $\frac{1}{4}$ -inch through 16 gauge. Deep Throat—2 inches. Weight—3 pounds. Punches and Dies— $\frac{1}{8}$ " to  $\frac{1}{2}$ " by 64ths.

No. 6 PUNCH



Length—26½ inches. Capacity— $\frac{1}{4}$ -inch hole through  $\frac{1}{8}$ -inch iron; especially adapted for button punching or templet work. Punches and dies  $\frac{1}{8}$ " to  $\frac{1}{2}$ " by 32nds.

No. 91 PUNCH



Capacity— $\frac{1}{4}$ -inch hole through  $\frac{1}{4}$ -inch, 1-inch hole through  $\frac{1}{8}$ -inch and 2-inch hole through  $\frac{1}{4}$ -inch iron. Depth throat 5-inches. Weight—82 lbs.

We have tools for every purpose needed by Sheet Metal Contractors.

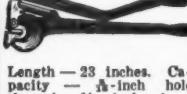
Ask your Jobber

No. 1 PUNCH



Length—34 inches. Capacity— $\frac{1}{4}$ -inch hole through  $\frac{1}{4}$ -inch iron. Punches and dies in sizes from  $\frac{1}{8}$  to  $\frac{1}{2}$ " by 64ths.

No. 2 PUNCH



Length—23 inches. Capacity— $\frac{1}{4}$ -inch hole through  $\frac{1}{4}$ -inch iron. Punches and dies in sizes  $\frac{1}{8}$ -inch to  $\frac{1}{2}$ -inch by 64ths.

CHANNEL IRON PUNCH



Companion to No. 2 Punch. Every part of the two punches interchangeable, including punches and dies. Capacity— $\frac{1}{4}$ -inch hole through  $\frac{1}{4}$ -inch iron.

For your convenience in obtaining copies of new Literature, use the coupon on page 108.

### 142—Sheet Strip Stock List

Central Steel & Wire Company, 4545 S. Western Blvd., Chicago, is distributing Stock List No. 35, dated February 8, 1937.

### 143—New House Organ

The Sullivan Co., Memphis, Tennessee, manufacturing technicians—paints, caulking compounds and metal coatings—mailed No. 1 of Vol. 1 of their new house organ early in March to architects, contractors, engineers and building supply dealers. The house organ is entitled "Famous Pictures" with views of buildings all over the world, with suitable identification.

### 144—Crimped Coils

American Nickeloid Company, 1 North Second Street, Peru, Illinois, is distributing a folder illustrating crimped coils—American Bonded Metals in coils—in all standard widths and lengths, precrimped and prefinished. They are ready to stamp or form for trim and decoration, for paneling, for table edges, for displays and window interiors, for toys and novelties of all kinds.

American Bonded Metals in Crimped Coils are easily fed to automatic machines, bringing faster production and lower costs, they say, because three manufacturing operations are saved—plating, polishing and lacquering.

### 145—S-N Dealer Broadsides

Scott-Newcomb, Inc., 1922 Pine St., St. Louis, is distributing a new broadside entitled "A New Day Is Here." Scott-Newcomb products are illustrated and described, and the men behind the products are pictured, together with sixteen views of the factory interior and operations. Introductory paragraphs call attention to the building boom expected, and outlines a ten-year profit plan for dealers.

### 146—Zinc Metals and Alloys

The New Jersey Zinc Company, 160 Front Street, New York City, has just published "Zinc Metals and Alloy" for those interested in die casting or other processes involving zinc in the metal working industry. This booklet briefs information concerning all of the company's metal products except rolled zinc. Descriptions cover preferred grades of slab zinc for galvanizing when a coat of superior bending properties is required; for brass and other alloys; for the elements of primary wet batteries; and for anodes in electroplating.

A large section of the booklet is devoted to Zamak alloys for die castings to meet the growing demand for die casting alloy information. There are included figures on physical properties, dimensional stability, corrosion resistance, A. S. T. M. Specifications, etc.

### 147—Transite Flue Pipe Book

Johns-Manville Corp., 22 East 40th St., New York, N. Y., has just made available a 20-page brochure describing J-M Transite Flue Pipe, an asbestos-cement product for venting domestic gas burning appliances.

Besides a description of the pipe, this brochure contains photographs of actual installations, both inside and outside, along with tables of weights and prices on both round and oval Transite Flue Pipe and fittings. In addition, the brochure contains more than 30 complete detail drawings covering every phase of installing the material in various types of construction and under a wide range of structural conditions. Included are drawings showing how to install Transite Flue Pipe in exterior and interior frame and brick veneer walls; how to install J-M Flue Pipe on the exterior of buildings of various types; and how the pipe should be installed in connection with brick chimneys, both in running it into the chimney and in using it as chimney liners.

**W.A. WHITNEY MFG. CO.**  
636 RACE ST. ROCKFORD, ILL.

## New Literature . . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 108.

### 148—Galvanized Paintgrip Sheets

The American Rolling Mill Company of Middletown, Ohio, is distributing a folder describing the advantages of Armco galvanized paintgrip sheets. Paintgrip is a new Armco galvanized sheet metal that is paintable without special acid treatments or weathering.

Forming qualities, soldering practice, welding, cleaning and finishing operations are described in the folder.

Paintgrip is available in base metals of Armco Ingot Iron, copper-bearing steel or plain steel.

### 149—Album of Familiar Belts

United States Rubber Products, Incorporated, 1790 Broadway, New York City, has released an "Album of Familiar Belts," a folder containing twenty-five reproductions of photographs taken in the field and in the factory.

These pictures show interesting and unusual installations of transmission belts in a variety of industries, as well as a number of exceptional studies made by Margaret Bourke-White, chief photographer for "Life."

### 150—Solution of Metal Problems

The International Nickel Company, Inc., 67 Wall Street, New York City, is distributing a new booklet describing the solution to scores of actual metal problems as encountered by the engineer. This 48 page, illustrated booklet has been prepared primarily as a guide book to Monel and other non-ferrous nickel alloys in the field of engineering applications. It also covers the corrosion resistance and other properties of these metals.

The booklet includes 20 sub-divisions, each devoted to specific problems in fields from hydroelectric and steam power plants to highway maintenance, refrigeration and automobiles.

Besides going into details of standard Monel the booklet describes some of the newer forms of this alloy, including "K" Monel, "S" Monel and the like. The non-magnetic forms of the metal are also covered in a special section devoted to airplanes and the like. Inconel, the high nickel-chromium alloy, is another subject covered.

Special items included are those dealing with meters and other regulating equipment, sewage disposal, pump maintenance and other items of general interest. The booklet is available to members of all branches of the engineering profession.

### 151—Workshop Precision Lathe

The South Bend Lathe Works, South Bend, Indiana, has published a new 24-page catalog announcing their new 1937 model 9-inch workshop precision lathe. Over 150 illustrations show the many new styles, features, and applications of the new back-gearied, screw-cutting lathe.

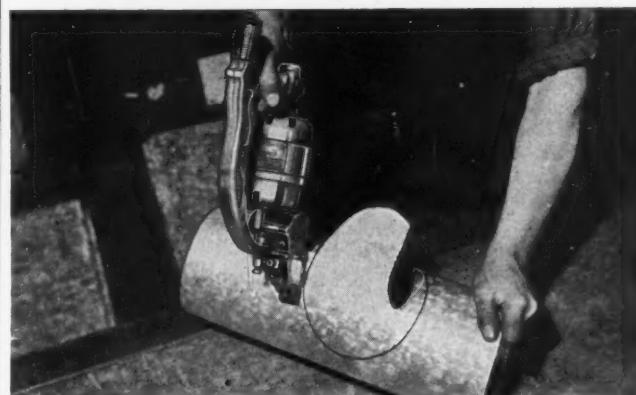
The new 9-inch Workshop Lathe for 1937 is offered in seven different styles to fit a wide number of installations. These new styles are: (1) The Adjustable Belt Tension Horizontal Motor Drive; (2) The Countershaft Drive; (3) The Underneath Belt Motor Drive; (4) The Pedestal Motor Drive; (5) The Tool Room Lathe; (6) The 9-11 in. swing Workshop Lathe; and (7) The Plain Type Horizontal Motor Drive.

The new 1937 Workshop Lathe is said to cut screw threads from 4 to 40 per inch, and with a fine thread cutting attachment the number is increased to 80 threads per inch. A precision lead screw cut on a special machine allows cutting the most accurate threads.

The 9-inch Workshop Lathe takes 38 different attachments for handling all types of metal work. A number of pages illustrate and describe these different attachments, which include: the draw-in collet chuck, turret, gear cutting, taper, indexing, milling and key way cutting, grinding, etc.



## FROM BUS BODIES TO SMOKE PIPES



Stanley Unishears are equally popular for the full time production job on sheet metal or the occasional hurried order.

They cut any type of sheet metal. They follow any line — straight, curves or angles — with hairline accuracy. No waste or distortion of metal. Portable Unishears have Universal motors and run from any light socket. You will find Stanley Unishears a handsomely paying investment.

Portable Unishears are made in three sizes, to cut 18, 16 or 14 gauge hot rolled steel; stationary Unishears are made in 7 sizes to cut anything up to  $\frac{1}{4}$ " boiler plate.

#### STANLEY "MIGHTY MIDGET" UNISHEAR

Only \$59.00. Cuts up to 18 gauge hot rolled steel. Weighs 7 pounds.



"Mighty Midget"

#### STANLEY No. 16 UNISHEAR

Similar to "Mighty Midget." Cuts up to 16 gauge hot rolled steel. Weighs  $9\frac{1}{4}$  pounds.



No. 16

#### STANLEY No. 144 UNISHEAR

Cuts up to 14 gauge hot rolled steel. Weighs  $19\frac{1}{2}$  pounds.

Write for Catalog No. 64M which describes in detail all Stanley Electric Tools.

#### STANLEY ELECTRIC TOOL DIVISION

*The Stanley Works  
131 Elm Street, New Britain, Conn.*

**STANLEY UNISHEARS**  
THE ELECTRICALLY DRIVEN HAND SHEARS

## HIGH SPEED SHEARING

**Of Irregular Shapes  
—Splitting—  
Ring and Circle  
Cutting**

The ideal shear for sheet metal work — absolutely accurate and easily operated . . . . . metal is sheared and not punched . . . . . cut anywhere, no starting holes required for inside cutting . . . . . only one adjustment for various thicknesses of material used . . . . . material does not feed itself by action of the cutters . . . . . unobstructed cutting vision . . . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . . . long life shear blades. Standard equipment furnished for splitting sheets, ring and circle cutting. Write for complete information.



**LIBERT MACHINE CO.**  
Green Bay, Wisconsin

*Manufacturers of shears since 1915*

**Liberty Method**

## NU DRY FURNACE CEMENT

When your furnace repair jobs call for an economical, durable cement, you can't do better than NU-DRY. Just check the six superior features and you'll see why most furnace men use it.

Fill out the coupon for free 5½ lb. sample. . . .

- It comes to you in dry form.
- Takes less material to set a furnace.
- Does not crack or powder when furnace is fired immediately after applied.
- Will not shrink—keeps joints tight—stands high temperature—is not affected by temperature changes.
- No loss because it will not harden in containers—will not freeze in winter.
- Requires only 5½ lbs. where you ordinarily ship 10 lbs.—It saves freight.

**PYROLITE PRODUCT CO.**  
1221-31 W. 74th St., Cleveland, Ohio

Name . . . . .  
Address . . . . .  
Jobber's Name . . . . .  
Jobber's Address . . . . .

## New Literature

For your convenience in obtaining copies of new literature, use the coupon on this page.

### 152—Catalog 37G

The Independent Register Co., 3847 East 93rd St., Cleveland, Ohio, is distributing Catalog No. 37G, illustrating and describing their registers, ventilators and grilles, with tables of sizes and prices.

### 153—Comfort a Child Can Control

Holcomb & Hoke Mfg. Co., 1545 Van Buren St., Indianapolis, Indiana, is distributing three new pieces of literature illustrating and describing the Fire Tender coal stoker. The theme of their literature is "comfort a child can control."

The company also makes a two-unit industrial Fire Tender for apartments, garages, institutions, shops, etc.

### 154—Prize Contest Brochure

The James F. Lincoln Arc Welding Foundation, P. O. Box 5728, Cleveland, Ohio, is distributing a Lincoln Foundation prize contest brochure. It contains the rules and conditions governing the \$200,000 contest and defines each industry classification in its contest application. The brochure also lists typical machines, structures, buildings, manufactured and fabricated products, which contestants may select as subjects for papers. Some of the typical subjects are illustrated.

### 155—Felt Tests

The Felters Company, Inc., 210 South Street, Boston, Mass., manufacturers of felt and felt products with mills at Millbury, Mass., Johnson City, N. Y., and Jackson, Mich., is distributing a book of felt tests—felt uses, Guggenheim tests, felt acoustics, isolation, vibration of textile machinery, special vibration investigation, heat conductivity of felts, and noise reduction, accompanied by samples of felt.

This company also publishes separately a booklet of "Felt Uses" and "A Study of Vibration in Plant Machinery."

### 156—Owens-Illinois Survey

Owens-Illinois Glass Company, Toledo, Ohio, is distributing a booklet entitled "One Out of Every Four"—a survey to determine the replacement market for warm-air furnaces in the United States.

The survey is intended for the use of manufacturers and their dealers.

#### FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave.,  
Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

39	40	41	42	43	44	45
46	47	48	49	50	51	52
53	54	55	56			
131	132	133	134	135	136	137
138	139	140	141	142	143	144
145	146	147	148	149	150	151
152	153	154	155	156		

Name . . . . . Title . . . . .

Company . . . . .

Address . . . . .

Are you Manufacturer — Jobber — Dealer —

## News Items . . . . .

### Corcoran in Flood Area

Matt Corcoran and Co., copperworks located at 118 North Fifth Street for half a century were in the flooded area of Louisville, Kentucky.

### New Incorporations and Dealer News

The Air Devices Corporation of Texas, 100 North Ewing street, Dallas, Tex., has engaged in air conditioning business.

The Fort Worth Air Conditioning Corporation has been chartered in Fort Worth, Tex., by Rice M. Tilley, Trinity Life Bldg., A. H. Rowan and others.

The Austin Heating & Sheet Metal Co., Austin, Minn., which was formerly owned by Standard Hardware Co., has been purchased by Joseph Rishavy of Winona and John Rishavy and Irwin Petersen of Austin.

The King Lumber Co., Grand Rapids, Mich., has begun erection of a sheet metal shop.

The Gordon Company, Inc., Davenport, Ia., has been chartered with a capital of \$10,000, to engage in the air conditioning, heating and ventilation business, by Lee S. Gordon, president; Doree Gordon, treasurer; and Martin S. Gordon, secretary, all of Chicago, Ill.

The Alga Reece Sheet Metal Co., 1518 North Main St., Rockford, Ill., has begun erection of store and warehouse to cost about \$5,000.

The H. H. Peters Heating Co., 2412 West State street, Milwaukee, Wis., has been incorporated to deal in furnaces, etc., by H. H. Peters, Norman J. Harris and Raymond J. Ross.

Reliable Heat Treaters, Inc., has been chartered in Milwaukee, Wis., by John Dolhun, John Smith and Hazel Smith.

### Resistance Welding

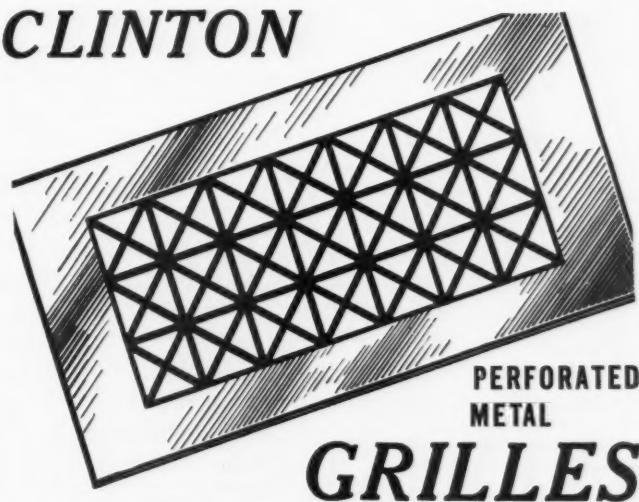
(Continued from page 29)

modate various sizes and shapes of work-pieces. In some machines the length of the electrode arms may also be adjusted. The amount of open space in the secondary circuit is relative to the secondary current the machine will develop. In most designs of machines the maximum power is obtained when the electrode arms are shortest and are placed the closest practicable. This adjustment is not of great importance, unless it is possible to attain this condition and the machine is operating at the highest heat-regulator point, in which case the increase in power may permit successful operation.

It is important that all parts of the secondary circuit be in intimate contact and all bolts tight. A periodical cleaning of all surfaces forming joints in this circuit is needed, since oil and dirt enter between surfaces and increase contact resistance. In some cases the current available in the secondary has been doubled by cleaning surfaces which had not been cleaned in years.

In the discussion to follow, methods of welding various metals and alloys will be described with particular reference to the application of these welding methods to machines of the type now in general use.

## CLINTON



Are available in one piece up to 60" x 156" in a wide variety of designs from stock dies and special patterns.

STEEL, STAINLESS STEEL, MONEL METAL, WISSCO BRONZE, NAVAL BRONZE, COMMERCIAL BRONZE

### WICKWIRE SPENCER STEEL COMPANY

41 East 42nd Street, New York  
Buffalo Worcester Chicago San Francisco  
*Send for this new GRILLE FOLDER.*



### WICKWIRE SPENCER perforated metals

Your Cash Register  
Rings Up \$36.71  
Every Time You Clean a Furnace

RECORDS by ordinary users of Super Furnace Cleaners show incomes of \$3670.90 per 100 furnace cleanings. The cleaning fees alone produced \$475.00. Sales of new plants, grates, pipes, promoted by the cleaning jobs, totaled \$3195.90 per 100 cleanings.

HOW did they do it? Read the "Plan Book," a complete, workable guide to the successful solicitation and handling of a furnace cleaning business.

#### ----- USE THIS COUPON -----

The National Super Service Company  
1944 N. 13th Street, Toledo, Ohio

Send me the Plan Book and complete information about your free trial plan and the new low-priced Super.

Name .....

Street Address .....

City & State .....

## Overton Church Heating

(Continued from page 26)

return air is 60 degrees. Air at 60 degrees weighs 0.0764 pounds per cubic foot. Air at 100 degrees weighs 0.07093 pounds per cubic foot. 0.07093 divided by 0.0764 equals .928. With 10,800 c.f.m. in the auditorium we recirculate 10,800 times .928 equals 10,022 c.f.m. for item 26, room 101. The other rooms with recirculation are figured in the same manner and we have a total of 11,369 c.f.m. at 60 degrees.

$$\begin{array}{l} 14,423 \text{ c.f.m. at 100 degree weighs } 14,423 \times 0.0709 \\ 11,369 \text{ c.f.m. at 60 degree weighs } 11,369 \times 0.0764 \\ \hline \end{array} \begin{array}{r} = 1023 \text{ pounds} \\ = 868 \text{ pounds} \\ \hline = 155 \text{ pounds} \end{array}$$

Pounds of air from outside at -10 degree

To determine the temperature of the mixture of the air from outside and inside we have:  

$$\frac{868 \times 60 + 155 \times -10}{868 + 155} = 49+$$
 deg.

Our pounds of coal burned per hour is:

$$\begin{array}{r} 14423 \times 60 \times 0.068 \times 0.024 \times (120 - 49) = 139+ \\ 7,200 \end{array}$$

Our motor requirement is 5 hp. of speed and phase, and voltage suitable for the current available at the building. We provide suitable pulleys and a 6-in. endless leather belt.

We provide a humidifier of the pan type with not less than two

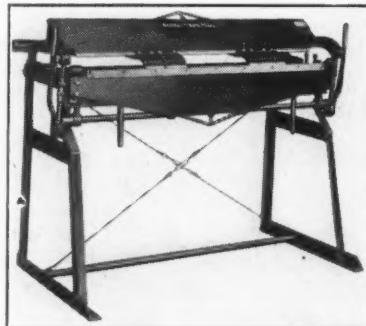
pans, one in front of each duct. Each pan shall have not less than 4 square feet of evaporating surface and cross connected with 1½-in. pipes so that the water may equalize in level. One pan shall be connected to float box on the outside wall of the plenum chamber and box shall contain a float valve to maintain the proper level of water in the pans. Provide pans with overflow pipes. The deck is constructed of 20 gauge painted corrugated iron laid on 2-in. × 2-in. × ¼-in. T bars. Over this corrugated iron is one layer of brick laid in rich mortar. (Fig. 11).

An alternate layout is shown in the dotted lines on Fig. 1 and 2. The heat risers for the auditorium are shown on either side of the choir space. The risers pass above the ceilings of rooms 102, 103 and turn out into the auditorium through registers above the doors.

The return system remains as shown. Rooms 3, 4, 104, 105, 106, are heated from a duct passing down through the center of the social room at the ceiling. The social room is heated through a register in the plenum chamber wall.

25 YEARS EXPERIENCE BUILDING QUALITY PRODUCTS

### "THE TOOLS YOU NEED TODAY"



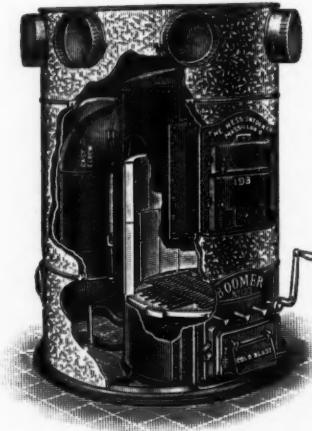
#### A PORTABLE 49 In. 20 Ga. FINGER BRAKE

Whitney Metal Tool leads the way again! Here is the answer to an urgent demand for a PORTABLE COMBINATION brake. It is the same basic design as the now-famous "Air Conditioning Special," with a simple change to permit the use of attachable fingers for box and pan bending as well as straight bending. See your Whitney dealer about it!

**WHITNEY METAL TOOL CO.**

91 FORBES ST., ROCKFORD, ILL.

OVER 80 ITEMS FROM WHICH TO CHOOSE



#### Boomer Boiler Plate Furnaces

Also made with duplex grates and upright shaker.

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are interested in selling a strictly high grade furnace, ask for prices and agency.

Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original pattern. Prices are low.

We sell to legitimate dealers only.

**THE HESS-SNYDER CO., MFRS.**

Massillon, Ohio

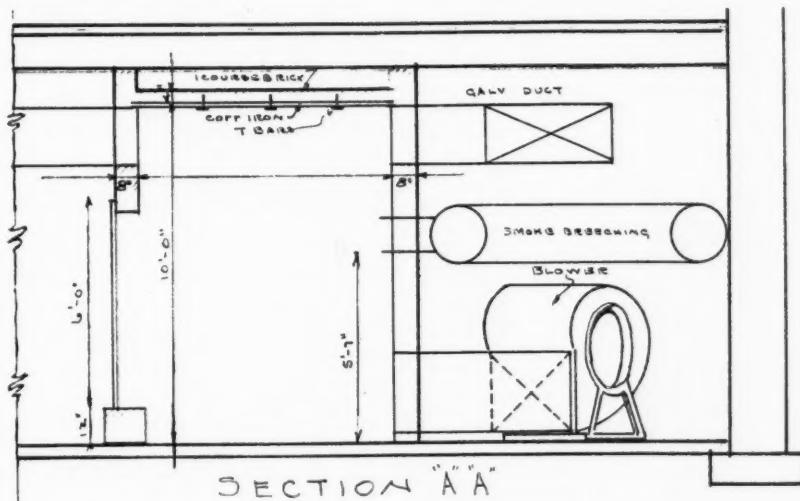


Fig. 11—Cross section through furnace-fan room showing construction of the corrugated iron on Tee bar roof with brick course above for insulation.

The velocity at the auditorium registers should be high. If we use the rule: 100 feet of velocity for every 10 feet of distance that the air must be forced, we will require a velocity at the grille face of 760 feet per minute, as it is 76 feet from the register to the front wall of the church over the balcony. Such high velocity registers should be at least

12 feet above the floor line.

This layout will be cheaper as it requires less sheet metal work and less labor.

The estimate sheet shown in the adjoining column has been filled in for this church installation using two supply ducts. The estimate is in dollars of cost with the items including both apparatus and fabrication.

### ESTIMATE SHEET

Furnaces	600.00
Manhole Doors	12.00
Firing Tools	10.50
T Bars	12.00
Angle Irons	30.00
Bolts	3.00
Belt Guard	2.40
Blower	YES
Motor	20.00
Starter	14.50
Switch	7.50
Wiring	12.20
Grilles	6.50
Registers	3.50
Pointing	4.50
Humidifier	2.00
Warm air risers	2.00
Warm air ducts	20.00
Volumedampers	1.50
Smoker pipe	0.50
Louver	2.00
Fan housing	1.50
Corrugated Iron	845.80
Freight	70.00
Cartage	25.00
Express	5.00
Sundries	10.00
Superintending	12.50
Labor	15.00
Total	
Overshead Cost	
Total Net Cost	
Profit	
Total	
Add for Automatic Control	
" " Brick Work Heaters	150.00
" " Bond	
" " Plans	
Deduct for	



## PREMIER FURNACE CLEANERS

ONE HORSE POWER MODELS \$79.50 and \$84.00  
HALF HORSE POWER MODELS \$55.00 and \$59.50

COMPLETELY EQUIPPED

Premier Furnace Cleaners are powerful and light weight, yet sturdily built to stand years of rugged service. Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the container for suction and blowing use in cleaning air ducts, registers, grills, radiators and air conditioning equipment.

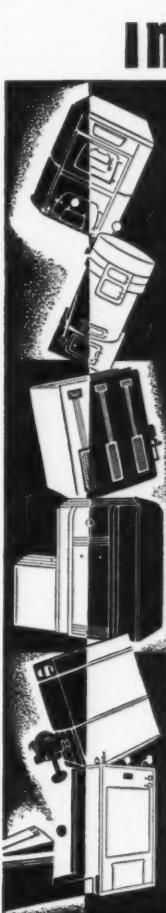
Motor specifications for these powerful cleaners are:

1 H.P. maximum vacuum 46 inches in water.  
½ H.P. maximum vacuum 31 inches in water.

Business Getting, Return Post Cards are Available for Dealers at Low Cost  
Buy It From Your Local Jobber or Write the Manufacturer

Furnace Cleaning Instruction Booklet Free with Each Cleaner

ELECTRIC VACUUM CLEANER CO., INC.  
1734 Ivanhoe Road Cleveland, Ohio



In  
*Every*  
**INSTALLATION**  
WHEREVER FURNACE CEMENT IS USED

### LACLEDE FURNACE CEMENT

Dries Faster  
Sets Stronger  
Lasts Longer

You may fire the furnace immediately and yet be sure of an air and gas tight joint that stays tight and withstands severe temperatures.

Free Sample on Request

**LACLEDE-CHRISTY**  
CLAY PRODUCTS COMPANY

ST. LOUIS • MISSOURI  
411 N. SEVENTH ST.

**"BB" QUALITY**

**PORTABLE SHEARS**  
ALL-ALLOY

**A GRAND RAPIDS FURNACE CLEANER**  
will start your Spring business.

**for  
BOILER  
FURNACE  
AND STOVE  
REPAIR PARTS**

**A.G.BRAUER**  
SUPPLY CO.  
316  
N. THIRD  
ST.  
ST. LOUIS, MO.

## Social Security

(Continued from page 27)

cess of \$1,000.00 each year, for the calendar years 1937, 1938 and 1939, and that you should pass on during the late part of 1939, leaving the business to your sons. They would at your death cease to be employees, would become employers, and even though they would have earned in excess of \$3,000.00 after the first day of January, 1937, they would have worked some part of only three years as employees, and the Federal Social Security Act (Section 210 (c) )provides as follows:

"The term 'qualified individual' means any individual with respect to whom it appears to the satisfaction of the Board that—

- (1) He is at least 65 years of age; and
- (2) The total amount of wages paid to him, with respect to employment after December 31, 1936, and before he attained the age of sixty-five was not less than \$2,000.00; and
- (3) Wages were paid to him, with respect to employment on some five days after December 31, 1936, and before he attained the age of sixty-five, each day being in a different calendar year."

From the quotation above, it would appear that unless your sons stepped out of character for at least one day in each of two years, and became employees of some employer, as contemplated by the Act, they would fail to qualify for the Old Age Benefits payments because of the fact that they did not have the five days employment—each day in a different calendar year.

Again, let's take the position that this Act had been in effect for some years and that you had earned at least \$2,000.00; had worked the required five days—each in a different calendar year, and are now past the age of 65. Notwithstanding the fact that you, in your earlier years had paid for your old age benefits, you would be denied them under the terms of Section 202 (d), which reads:

"Whenever the Board finds that any qualified individual has received wages with respect to regular employment after he attained the age of sixty-five, the old-age benefit payable to such individual shall be reduced, for each calendar month in any part of which such regular employment occurred, by an amount equal to one month's benefit. Such reduction shall be made, under regulations prescribed by the Board, by deducting from one or more payments of old-age benefit to such individual."

You, being above the age of sixty-five, are still regularly employed and had this act been in effect for forty or fifty years, and had you been an employee during all of those years and paid each month your required tax, the mere fact that you are still working would serve to prevent you from obtaining the benefits which you had paid for.

What would the Insurance Laws of your state of Ohio have to say to an insurance company that took your premiums annually for a term of thirty, forty, or fifty years, in payment of an annuity to begin when you attained the age of sixty-five, and then told you that notwithstanding the fact that you had paid for this annuity, you could not have it if you were gainfully employed. You bought and paid for that annuity, and should have it, regardless of anything you may do towards adding to the annuity you are entitled to receive. The Federal Government, however, says, that employees and employers shall pay for the old age benefits to accrue to the workers when they shall have attained the age of sixty-five, and then says that in order that the aged workers may receive that which they and their employers have bought and paid for, the beneficiaries of the annuity so bought and paid for shall receive the benefit only if they refrain from regular employment.

We believe, after you have digested this letter, you will come to the conclusion that your sons are better off as partners, that through being partners they will not come under the provisions of the Social Security Act, and that the greatest good will come to you and to them by carefully analyzing the several points raised in this letter and protecting your interests and theirs as best you can.

## State Unemployment Compensation Laws

(Continued from page 23)

The New York law is unique in that it fails to exclude domestic servants if as many as 4 are employed.

### Wage Exclusions

In only four States is the amount of salary paid made the basis of a limitation of benefits. New Hampshire and New York provide for the exclusion of non-manual workers paid at the rate of more than \$2,500 a year in New Hampshire and \$2,600 a year in New York. Massachusetts excludes from benefits all workers whose rate of pay was \$2,500 per year. Persons making \$150 a month or more for 10 months out of the past 12, on a fixed salary, are disqualified from benefits in Wisconsin.

### Disqualifications for Benefits

Discharge for misconduct, a labor dispute in the establishment, voluntary quitting of work, and refusal of suitable employment are grounds in all States for extension of the waiting period or for complete disqualification. The administrative agency is usually given leeway to fix the waiting period in these instances. In Mississippi, the person who has been discharged for misconduct is ineligible until he goes back to work. In other States, the waiting period may be extended for such discharge, by anywhere from 1 to 9 weeks at the discretion of the administrative agency. In cases of labor disputes, all States, except New York and Rhode Island, provide that a man is ineligible until the dispute is ended. In these 2 States, this waiting period in such case is extended to 10 weeks.

While a person is receiving wages in lieu of notice, workmen's compensation for temporary partial disability, or old-age benefits, he is ineligible for unemployment compensation, according to the laws of Indiana, Louisiana, Mississippi, South Carolina, Texas, and Utah, but in all these States except Indiana he may receive the difference between unemployment benefits and such remuneration if the latter is less than he would otherwise receive. Massachusetts applies this same rule, but only to workmen's compensation, and Idaho applies it to wages in lieu of notice and old-age benefits. In California, there is a residential restriction. The person must have been a resident of the State for one year preceding his unemployment. This is the only State having a residence requirement.

Students are ineligible during their vacation periods in California and are completely excluded in Wisconsin. In the District of Columbia a person under 21 is ineligible so long as he fails to attend school when so directed.

### Hearings on Denied Claims

Inasmuch as the Social Security Act provides that a fair hearing for a person claiming benefits is a requisite for approval, all States provide for an initial determination of a claim, an appeal tribunal, and review by the courts thereafter. The initial determination may be made by a deputy of the commission or a local employment office official, as the law may require.

## BURT VENTILATORS



The complete Burt line enables you to compete to advantage for every roof ventilator job. Four distinct types in all sizes, standard and special, quality made, priced to give plus values. Call freely on our Engineering Department to help you figure. No obligation. Write for catalogs.

## THE BURT MFG. CO.

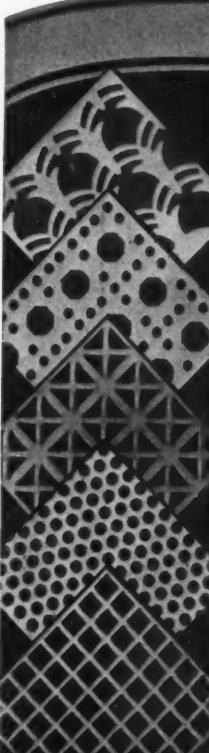
ROOF VENTILATORS • OIL FILTERS  
EXHAUST HEADS

301 MAIN STREET • AKRON, OHIO

## INDUSTRIAL

## PERFORATED METALS

## ORNAMENTAL



The H. & K. line offers a wide selection of ornamental and decorative grilles for public and private buildings suitable for radiator enclosures, ventilators and air conditioners. Write for Booklet No. 30.—Industrial screens for grading and separating many products— for safety guarding and other uses. Unusual specifications carefully executed.

ANY METAL  
ANY PERFORATION

*The*  
**Harrington & King**  
PERFORATING Co.

## SAVES YOU MONEY



Lyonore Metal saves repairs and maintenance costs by retarding the corrosion rate from gnawing in. Outlasts by years other sheet metals of comparable price. You save most when you get the best--insist upon Lyonore Metal for all sheet metal work. Send for details.

**LYON, CONKLIN & CO., Inc.**  
Baltimore, Maryland

## Lyonore Metal

CHROMIUM • NICKEL • COPPER • IRON ALLOY

## FURNACE REPAIRS

made with



*Fit Right — Last Longer*

**THE NATIONAL FOUNDRY & FURNACE CO.**  
1144 Bolander Ave. DAYTON, OHIO

## How to Sell Furnaces and Repairs



**Breuer Electric Mfg. Co.**  
865 Blackhawk Street, Chicago, Ill.

### WITH The TORNADO Furnace Cleaner

The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

The TORNADO is the most powerful furnace cleaner built. Leads the field! Low price—easy payments—free trial. Approved by Anthracite Institute and Underwriters Lab. Thousands in use. Write now for complete information.

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SHEET METAL WORKING  
MACHINERY

A machine for each Sheet Metal operation. Experienced personal assistance given to special production problems and selection of equipment best suited to each particular shop's needs. At your Service. Send us your problems—your inquiries also.

564 W. Washington Blvd.

Chicago, Ill.

## Convention

(Continued from page 34)

As another place in which true air conditioning is not delivered, the speaker suggested that humidification (despite many years of application and many millions of words of publicity) is still in its infancy so far as those supplying residential air conditioning are concerned. The public in general and the warm air heating industry in particular have accepted 45 or 50 percent relative humidity as desirable during the winter, whereas actually very few houses can have more than 25 percent relative humidity when outside temperatures are zero.

### Constant Fan Operation

As an additional place where we are claiming to air-condition and actually do not, the speaker suggested that the matter of air changes per hour should be approached with caution. We design systems for a certain number of air changes per hour and assume that the fan will run all the time. Actually fans run intermittently in most instances and when the fan is idle, the whole system is out of balance. We do not circulate the air; therefore we do not provide the air changes suggested; we do not ventilate nor circulate and the operation of the system is entirely at variance with its operation when the fan is running. The speaker suggested that the industry is slowly approaching the time when continuous fan operation will be the accepted procedure rather than the exception.

### Ohio Compensation Tax

The concluding speaker on the day's program was H. B. Davis, treasurer of the Lundoff-Bicknell Company, speaking on the subject "Workmen's Compensation." Mr. Davis, as president of the Ohio Construction Council, declared that he had only one idea to present; namely, that the high rate of taxes for unemployment compensation are due to one condition which exists in Ohio, namely, the chiseling by many contractors who through one means or another do not pay any employment compensation tax.

The result of this chiseling is that those contractors who do pay the tax are carrying the accident load for the contractors who refuse to pay.

Mr. Davis also declared that only active co-operation by all members of the industry can correct the present flat rate between outside and inside work and bring to recognition the fact that the sheet metal and warm air heating industry is not such a hazardous occupation as the tax payments seem to indicate.

Mr. Davis introduced E. K. Evans, actuary for the Industrial Commission of Ohio, who explained exactly how the present \$8 blanket rate for inside and outside work was determined. He explained that this rate is an average of the rate of \$1.10 for inside to \$10.50 for outside work on galvanized iron, cornice, inside shop work and so forth.

## You Can Expect More From RubyFluid

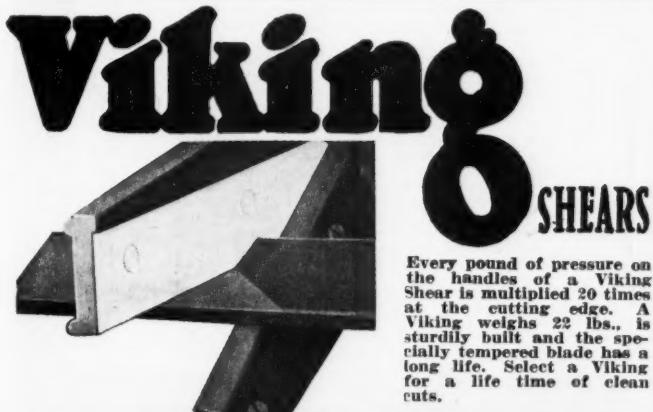
Write for  
Sample.



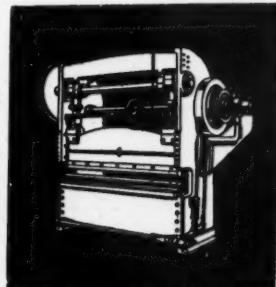
Because it has a score of features designed to handle all soldering jobs faster and economically. Fluxes all metals quickly without odor or corrosion. Available in liquid or paste flux, acid or rosin core solder.

**RUBY CHEMICAL CO.**  
74 McDowell St.  
Columbus, Ohio

# Rubyfluid

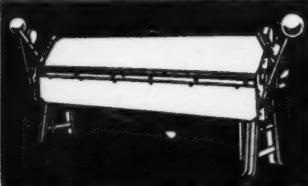


VIKING SHEAR CO. ERIE, PA.



PRESS BRAKE

## CHICAGO



HAND BENDING BRAKE

Steel Brakes—Presses—Shears

**DREIS & KRUMP MFG. CO.**  
7404 LOOMIS BLVD. CHICAGO

## ACME "Hot Spot" WELDERS

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

Write for literature and prices

Don't Rivet

**S P O T W E L D !**  
with an ACME

Lifetime Guarantee!

Complete range of sizes

**ACME ELECTRIC WELDER CO.**  
Warehouses in principal cities

5619 Pacific Blvd.



Huntington Park, Calif.  
(Los Angeles County)

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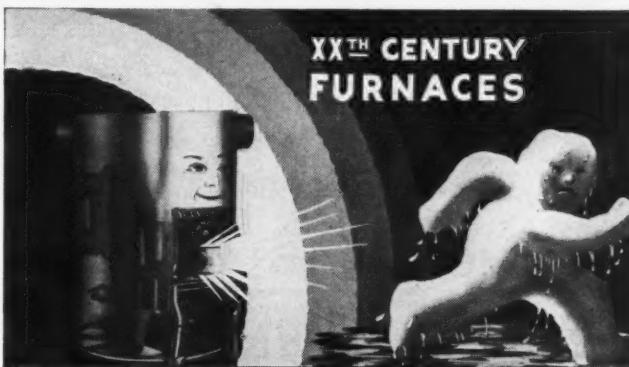
More than twenty kinds of prime quality sheets are carried in stock. There is a special sheet for every purpose. Also Bars, Angles, Rivets, Bolts, Tools and Metal-Working Machinery.

Write for Stock List

**JOSEPH T. RYERSON & SON INC.**  
CHICAGO DETROIT MILWAUKEE JERSEY CITY BUFFALO PHILADELPHIA  
ST. LOUIS CINCINNATI CLEVELAND BOSTON

# SHEETS

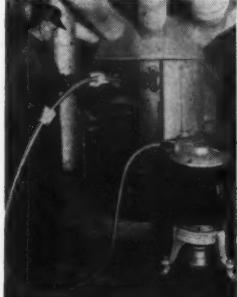
XX<sup>TH</sup> CENTURY  
FURNACES



KEEP OLD MAN WINTER ON THE RUN

XX<sup>TH</sup> CENTURY HEATING & VENTILATING CO.  
AKRON, OHIO

The best investment for  
furnace cleaning



## KENT

FURNACE VACUUM CLEANER

Do a faster, better job with the KENT. Save time and money on upkeep and repairs.

Own the longest life machine on the market—and PROFIT.

Double Suction—Twice the  
Power—One-Man Unit

**THE KENT COMPANY, INC.**  
167 CANAL STREET ROME, N. Y.

SALTS OR PASTE?

Either IF IT'S GOOD  
**BURNEY** OLD TRADE MARK



The Paste is ready to use—the  
Salts need a little water—you'll know how much for that's  
experience. Whichever you  
choose you can be sure that  
you have made a good choice.  
Write for sample—buy from  
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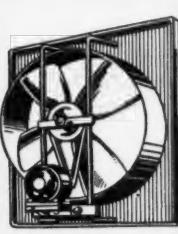
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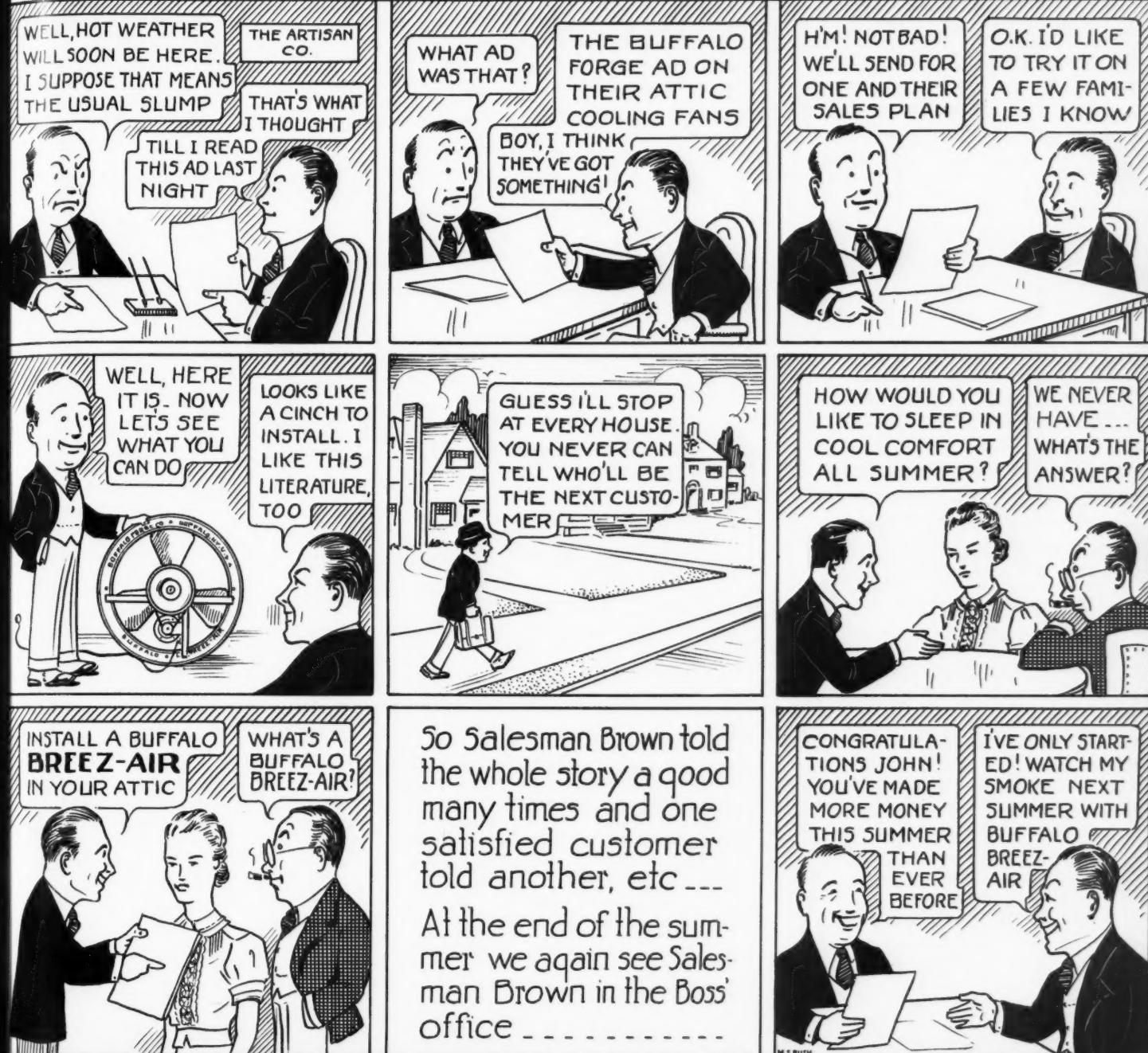
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